

# **Kodiak Management Area Sockeye Salmon Catch and Escapement Sampling Operational Plan, 2007**

by

**M. Birch Foster**

May 2007

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Alaska Department of Fish and Game

Division of Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mid-eye-to-fork	MEF
gram	g	all commonly accepted		mid-eye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	<b>Mathematics, statistics</b>	
meter	m			<i>all standard mathematical</i>	
milliliter	mL	at	@	<i>signs, symbols and</i>	
millimeter	mm	compass directions:		<i>abbreviations</i>	
		east	E	alternate hypothesis	H <sub>A</sub>
		north	N	base of natural logarithm	<i>e</i>
		south	S	catch per unit effort	CPUE
		west	W	coefficient of variation	CV
		copyright	©	common test statistics	(F, t, $\chi^2$ , etc.)
		corporate suffixes:		confidence interval	CI
		Company	Co.	correlation coefficient	
		Corporation	Corp.	(multiple)	R
		Incorporated	Inc.	correlation coefficient	
		Limited	Ltd.	(simple)	r
		District of Columbia	D.C.	covariance	cov
		et alii (and others)	et al.	degree (angular)	°
		et cetera (and so forth)	etc.	degrees of freedom	df
		exempli gratia		expected value	<i>E</i>
		(for example)	e.g.	greater than	>
		Federal Information		greater than or equal to	≥
		Code	FIC	harvest per unit effort	HPUE
		id est (that is)	i.e.	less than	<
		latitude or longitude	lat. or long.	less than or equal to	≤
		monetary symbols		logarithm (natural)	ln
		(U.S.)	\$, ¢	logarithm (base 10)	log
		months (tables and		logarithm (specify base)	log <sub>2</sub> , etc.
		figures): first three		minute (angular)	'
		letters	Jan,...,Dec	not significant	NS
		registered trademark	®	null hypothesis	H <sub>0</sub>
		trademark	™	percent	%
		United States		probability	P
		(adjective)	U.S.	probability of a type I error	
		United States of		(rejection of the null	
		America (noun)	USA	hypothesis when true)	α
		U.S.C.	United States	probability of a type II error	
			Code	(acceptance of the null	
		U.S. state	use two-letter	hypothesis when false)	β
			abbreviations	second (angular)	"
			(e.g., AK, WA)	standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var
<b>Weights and measures (English)</b>					
cubic feet per second	ft <sup>3</sup> /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
nautical mile	nmi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
<b>Time and temperature</b>					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
degrees kelvin	K				
hour	h				
minute	min				
second	s				
<b>Physics and chemistry</b>					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt,				
	‰				
volts	V				
watts	W				

# **KODIAK MANAGEMENT AREA SOCKEYE SALMON CATCH AND ESCAPEMENT SAMPLING OPERATIONAL PLAN, 2007**

by

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May 2007

The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric, and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: <http://www.sf.adfg.ak.us/statewide/divreports/html/intersearch.cfm>.

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# TABLE OF CONTENTS

	Page
LIST OF TABLES.....	ii
LIST OF FIGURES.....	ii
LIST OF APPENDICES .....	ii
ABSTRACT .....	1
INTRODUCTION.....	1
GOAL.....	2
OBJECTIVES.....	2
TASK.....	2
SUPERVISION .....	3
PROCEDURES .....	3
Escapement.....	3
Catch.....	4
DATA REPORTING.....	4
TABLES AND FIGURES.....	7
APPENDIX A. ADULT SALMON SAMPLING.....	19

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
1. Kodiak Management Area sockeye salmon escapement sampling schedule, 2007.....	8
2. Kodiak Management Area sockeye salmon catch sampling schedule, 2007.....	9

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1. -Map depicting the Kodiak Island Group and the Kodiak Management Area commercial salmon fishery districts, 2007. ....	10
2. -Salmon escapement, special harvest area, and processing facility sampling locations in the Kodiak Management Area, 2007. ....	11
3. -The “Scott” six-panel adult salmon live box trap (photo taken at Upper Station weir). ....	12
4. -Kodiak Management Area commercial salmon statistical areas sampled to represent Uyak Bay harvest. ....	13
5. -Kodiak Management Area commercial salmon statistical areas sampled to represent Uganik/Viekoda/Kupreanof bays harvest.....	14
6. -Kodiak Management Area commercial salmon statistical areas sampled to represent Moser/Olga gillnet (dotted) and Alitak seine area harvest. ....	15
7. -Kodiak Management Area commercial salmon statistical areas sampled to represent Southwest Kodiak District (Karluk/Sturgeon, Halibut/Gurney bays, and Ayakulik areas) harvests. ....	16
8. -Kodiak Management Area commercial salmon statistical areas sampled to represent Special Harvest Areas (SHA) at Waterfall, Foul, Kitoi, and Spiridon SHA. ....	17

## LIST OF APPENDICES

<b>Appendix</b>	<b>Page</b>
A1. -Procedure for sampling adult salmon for age, length, and sex.....	20
A2. -Completed adult salmon OPSCAN form (front side) and associated gum card.....	26
A3. -Assigned port and weir location codes.....	27
A4. -Sampling weeks and associated calendar dates, 2007.....	28
A5. -Measuring fish length from mideye to tail fork. ....	29
A6. -Removal and mounting of the preferred salmon scale. ....	30
A7. -Scale orientation on the salmon scale gum card.....	31

## ABSTRACT

In the Kodiak Management Area (KMA), weirs provide the primary mode of enumeration for a majority of the sockeye salmon *Oncorhynchus nerka* escapements into area streams. Annually, the Alaska Department of Fish and Game samples sockeye salmon escapements from the Karluk, Ayakulik, Upper Station, Dog Salmon, Frazer, Litnik, and Buskin weirs for biological characteristics (age, sex, and length). In 1985 an expanded commercial salmon harvest (catch) sampling operation was initiated in the KMA, that, in combination with the escapement sampling, provide the foundation for preseason run forecasts, escapement goal evaluation, and accurate assignment of the run to stock of origin (run reconstruction). Commercial sockeye salmon catch in the KMA will be sampled for age from individual districts and sections throughout the 2007 season. The overall goal of the project is to provide data to assist with the inseason and long-term management of the KMA sockeye salmon runs.

Key words: Kodiak, weirs, sockeye salmon, *Oncorhynchus nerka*, escapement, sampling, age, length, sex, catch, scales.

## INTRODUCTION

The Kodiak Management Area (KMA) comprises the western portion of Gulf of Alaska waters surrounding the Kodiak Island Group and adjacent to the Alaska Peninsula from Cape Douglas to Kilokak Rocks (Figure 1).

There are about 800 anadromous salmon streams located throughout the KMA (Johnson and Weiss 2006). These systems combined support five commercially important salmon species: Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, coho *O. kisutch*, pink *O. gorbuscha*, and chum *O. keta* salmon. About 39 of these systems support various sizes of sockeye salmon runs (Dinnocenzo 2006). Alaska Department of Fish and Game (ADF&G) operated weirs provide the primary mode of enumeration for virtually all Chinook salmon and a majority of the sockeye salmon escapements into KMA streams (Figure 2; Spalinger 2006). Remaining streams are monitored by aerial and foot surveys to index pink, chum, and coho salmon escapements (Dinnocenzo 2006).

The KMA is composed of seven commercial salmon fishing districts (Figure 1) and 56 sections. The primary emphasis of the ADF&G salmon management program is to promote maximum production for future KMA salmon returns by supporting salmon escapement of sufficient magnitude and distribution (Wadle *in press*). Simultaneously, the goal is to provide for orderly fisheries, maximize harvest opportunities and product quality, and adhere to management plans adopted by the Alaska Board of Fisheries (BOF).

The BOF has approved area salmon management plans for the Cape Igvak Section of the Mainland District, Alitak District, North Shelikof Strait, Westside Kodiak, Eastside Afognak, Crescent Lake, Spiridon Lake, Eastside Kodiak, Mainland District, and North Afognak/Shuyak Island (ADF&G 2005). The intent of these plans is to maintain traditional commercial fishing opportunities and subsequent harvest allocations, stock conservation, and provide for a high quality salmon product.

Five species of salmon are commercially harvested within the KMA, all of which have established escapement goals. The “targeted” escapement goals for KMA salmon are approximately: 8 thousand to 17 thousand Chinook, 750 thousand to 1.7 million sockeye, 2.3 million to 5.8 million pink, 6 thousand to 14 thousand coho (on the Kodiak town road system streams only), and 300 thousand chum salmon (Nelson et al. 2005). Directed commercial fisheries occur on sockeye, pink, chum, and coho salmon; Chinook salmon are not targeted. To

open and close the fishery inseason, managers utilize qualitative analyses of run timing, catch per unit effort (CPUE) statistics, species composition estimates, regulatory management plans, aerial survey estimates, test fishery numbers, and weir escapement counts (Dinnocenzo 2006).

Age, sex, and length (ASL) composition of KMA sockeye salmon escapements have been collected under the direction of various researchers and agencies since the mid 1920s. The ADF&G, Division of Commercial Fisheries (CFD), initiated an expanded commercial harvest (catch) and escapement sampling program in 1985 focusing on sockeye salmon. The purpose of this program was to collect representative ASL data from major sockeye salmon systems as well as representative age data from selected commercial sockeye salmon catches. These data continue to expand the KMA salmon baseline ASL database. These samples are used to reconstruct numerous sockeye salmon runs, employing age marker analysis, scale pattern analysis (SPA), and historical harvest proportions to estimate specific stock contributions to commercial fisheries in the KMA (Baer and Honnold 2002; Barrett and Nelson 1994; Barrett and Nelson 1995; Foster 2006; Foster 2007; Nelson 1999; Nelson and Swanton 1996; Nelson and Swanton 1997; Sagalkin 1999; Swanton 1992; Witteveen et al. 2005). Accordingly, these samples provide the foundation for preseason run forecasting and escapement goal evaluation.

## **GOAL**

The goal of this project is to provide ASL composition data from the KMA commercial salmon catch and escapements to assist with the inseason and long-term management of the KMA salmon harvest.

## **OBJECTIVES**

Data derived from sampling of the KMA salmon commercial salmon catch and escapement will be used to achieve the following objectives:

- 1) Estimate the age (scales), sex, and length composition of sockeye salmon escapements into systems in the KMA.
- 2) Estimate the age composition of weekly sockeye salmon catch in major KMA harvest areas.
- 3) Construct accurate brood tables.
- 4) Develop accurate run forecasts.
- 5) Evaluate escapement goals and run timing.
- 6) Address mixed stock fishery issues and annual run reconstruction projects through possible scale pattern analysis (SPA).

## **TASK**

Collect representative samples of scales (for age determination), length, and sex from select sockeye and chum salmon catch and escapements within the KMA.



## **SUPERVISION**

Westward Region finfish research biologist Mark Witteveen will act as overall project leader and supervise inseason progress. KMA management biologists will supervise escapement sampling crews (Table 1). The Kodiak catch sampling project biologist will monitor weekly escapement sampling and review incoming data for quality, quantity, and timeliness. A logbook will be maintained by the project biologist tracking weekly samples, and the weir crew leaders will be given periodic feedback regarding data quality. Unacceptable ASL data forms will be returned to field camp for correction.

## **PROCEDURES**

The standard procedures for collecting and recording salmon ASL data are defined in Appendix A. The accuracy of the data and scale sample quality will be the responsibility of the field camp escapement crew leader or lead catch sampler. Because it is essential that all samples be representative, bias will be avoided by NOT pre-selecting fish based upon size, sex, condition or any other factor. If questions or problems arise, the project biologist should be contacted immediately for clarification or assistance.

All scales, when possible, will be collected from the preferred area of each fish following the methods described by International North Pacific Fish Commission (1963). Scales will be mounted on scale “gum” cards and impressions made on acetate/diacetate cards (Clutter and Whitesel 1956). Fish ages will be assigned by examining scale impressions for annual growth increments using a microfiche reader fitted with a 48X lens following designation criteria established by Mosher (1968).

The most common method of age determination in Pacific Salmon is the analysis of the concentric rings (circuli) on the scale. Fast summer growth results in wide spacing between circuli while slow winter growth results in closer spaced circuli; age is determined by enumerating the number of winters observed on the scale (Gilbert 1913). This method of age determination is ideal because the scale can be collected, processed, and aged quite rapidly. Problems encountered using scales for age determination include variable scale growth, scale regeneration, scale reabsorption, and age validation difficulties (Beamish and McFarlane 1983). While no true age validation will be used, a subsample of catch and escapement salmon scales are aged by separate readers for corroboration of age estimates.

Ages will be recorded on sampling forms using European notation (Koo 1962) where a decimal separates the number of winters spent in fresh water (after emergence) from the number of winters spent in salt water. All data will be recorded on standard optical scanning ASL (Opscan) data forms. Opscan forms will be digitally scanned and edited for errors.

### **Escapement**

For the major sockeye salmon systems (Table 1), weekly sockeye salmon escapement sampling for ASL will be conducted at Karluk, Ayakulik, Upper Station, Frazer and Dog Salmon weirs (Figure 2). Samples will be collected using a “Scott” six-panel adult salmon live box trap (Figure 3) incorporated into the weir. Three 80-fish samples will be collected weekly (sample week) on alternating days if possible (i.e., Friday, Monday, and Wednesday), to provide a better representation of weekly escapement (Table 1). The weekly minimum sample size is 240 fish (Thompson 1987). If escapement numbers decline and there is concern that the minimum sample

size will not be achieved, adjustments in sampling efforts should be implemented so that the weekly goal of 240 is met. During 2007, the sampling week starts on Thursday and ends on Wednesday. Sampling weeks and corresponding calendar dates are listed in Appendix A4.

For the Litnik sockeye salmon system, 600 sockeye will be sampled annually (Table 1) with the effort distributed throughout the season and proportional to escapement counts (i.e., peaks in sampling effort will occur during peaks of escapement). The Buskin River weir is operated by ADF&G Division of Sport Fisheries personnel and has an alternative sampling plan utilizing a subsistence harvest survey (Tracy and Schmidt *unpublished*).

## Catch

Select sockeye and chum salmon catches will be sampled for age (scales) on a weekly basis by the KMA salmon catch sampling crew and several field crews according to the sampling schedule (Table 2). To ensure that samples are obtained, the crews will begin sampling on the first day of delivery (or harvest) during the designated sampling week (Appendix A4). Each crew leader should review the 2007 Kodiak Commercial Salmon Fishery Harvest Strategy (Wadle *in press*) and become familiar with the basic management chronology and terminology.

Local and remote processing facilities (Kodiak, Larsen Bay, and Alitak) within the KMA will be contacted by phone daily to assess the potential arrival of tender and fishing vessels offloading salmon from areas prescribed to be sampled.

All catch samples are to be random, representative and without known bias. Deliveries containing fish harvested from non-targeted areas and deliveries containing loads of mixed origin (< 90% pure by weight) are not to be sampled. There will be no pre-selection of fish for length, sex, condition, or any other factor.

The sample size for each of the major harvest areas (Table 2; Figures 4–8) is a weekly collection of 400 fish when commercial harvest allows. The sample size was constructed to permit each age class proportion estimate to be within at least 0.075 of the true proportion with 90% confidence, regardless of number of age classes or population proportions (Bromaghin 1993; Thompson 1987). Sample sizes were set with the assumption that at least 80% of the scale samples will be readable. Typically the percentage of readable scales is greater than 80%. Obtaining scale samples of the highest quality will increase the percentage of readable scales and hence increase the precision of the estimates.

A reduced sampling scheme is required for the Waterfall, Foul, and Kitoi bays Special Harvest Areas (SHA). Those areas have a limited timeframe and salmon harvest magnitude and thus a seasonal sample size of only 600 fish is required (Table 2). The Spiridon Bay SHA (Telrod Cove) will be sampled in the same manner as escapement, with three 80-fish samples collected weekly on alternating days, for a weekly sample size of 240 salmon.

## DATA REPORTING

KMA weir crew leaders **WILL NOTIFY** Jeff Wadle, Joe Dinnocenzo, or Geoff Spalinger, via Single Side Band (SSB) radio or satellite telephone, of **weekly** sampling results. Field camp personnel will send completed samples back to Kodiak on return grocery or mail flights. Packages should be clearly labeled to include: system, sample dates, and Attn: Foster. The pilot should be instructed to call Fish and Game at 486-1857 for package pick-up.

When catch samplers are sampling at remote locations (e.g., Larsen Bay) they will report primarily to M. B. Foster by phone on a daily basis. The Port of Kodiak catch sampling crew will be responsible for pressing and aging all sockeye salmon scale samples (including escapement), updating the weekly sampling log, and cataloging all catch and escapement sampling data. Only those personnel passing the 2007 Westward Region scale-aging test administered by the project biologist will age the samples.

Data from both the catch and escapement samples in 2007 will be compiled and published by M. B. Foster in the 2007 Kodiak Management Area Catch and Escapement Sampling Results report that will be published in December of 2007.

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## **TABLES AND FIGURES**

**Table 1.-Kodiak Management Area sockeye salmon escapement sampling schedule, 2007.**

<i>System</i>		Statistical	Sampling	Date		Sample
Sample Location	Supervision	Area	Frequency	Start	End	Size
<i>Major Systems</i>						
Karluk River weir	Spalinger	255-10-101	3 times per week	25-May	30-Sep	240 (weekly total)
Ayakulik River weir	Spalinger	256-15-201	3 times per week	25-May	15-Aug	240 (weekly total)
Upper Station weir	Dinnocenzo	257-30-304	3 times per week	25-May	30-Sep	240 (weekly total)
Frazer Lake weir	Baer	257-40-403	3 times per week	1-Jun	30-Aug	240 (weekly total)
Dog Salmon Creek weir	Dinnocenzo	257-40-403	3 times per week	1-Jun	30-Aug	240 (weekly total)
<i>Minor Systems</i>						
Litnik (Afognak) weir	O'brien Caldentey	252-34-342	weekly	25-May	1-Aug	600 (season total)
Buskin River weir <sup>a</sup>	Tracy	259-21-211	3 times per week	20-May	15-Aug	653 (season total)

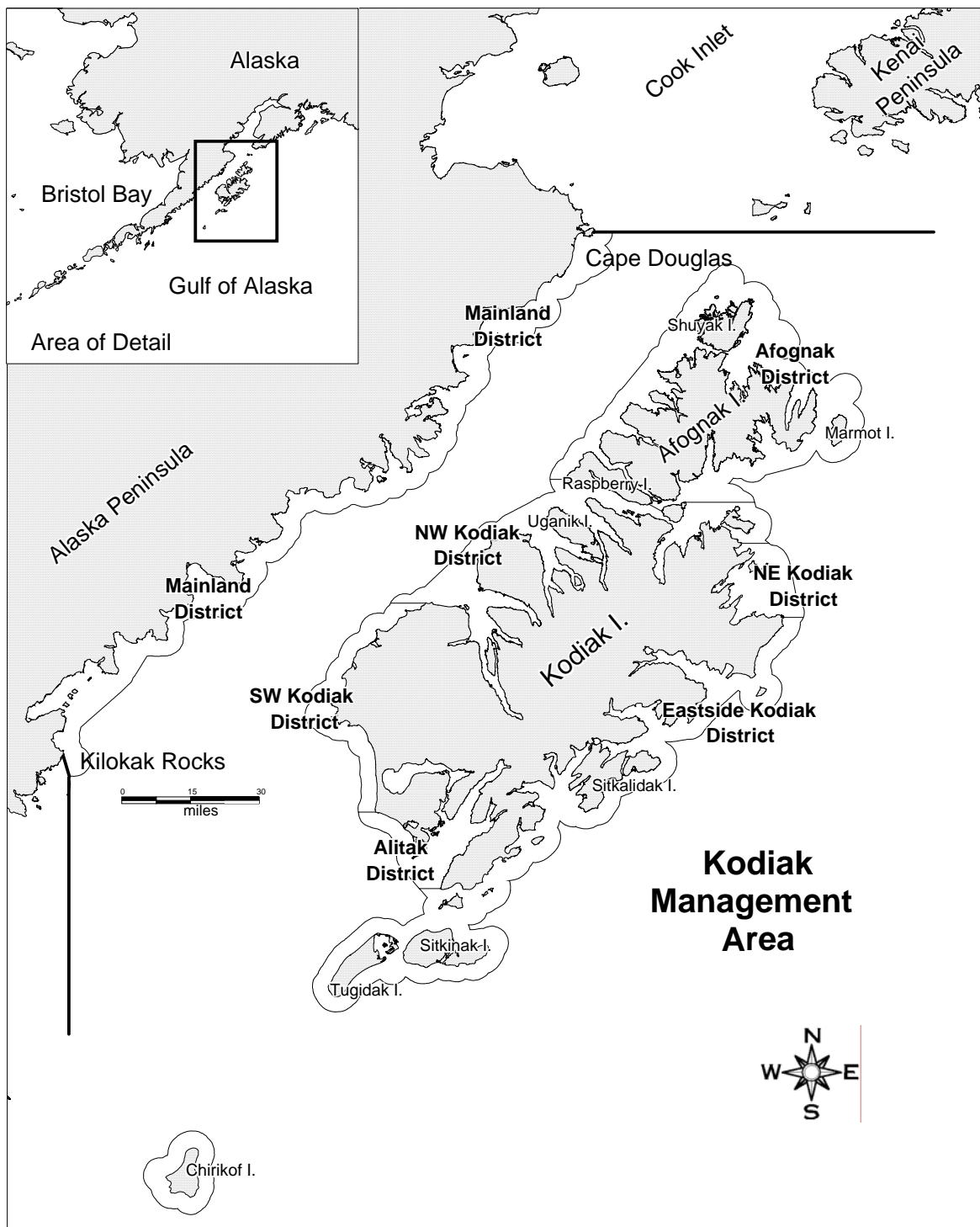
<sup>a</sup> Buskin River weir is operated by ADF&G Division of Sport Fisheries. Escapement sampling is supplemented with subsistence harvest sampling from 1 June to 15 July.

**Table 2.-Kodiak Management Area salmon catch sampling schedule, 2007.**

District	Geographic Area	Statistical Areas	Primary Sampling Site	Species	Project Supervision	Sample		
						Frequency	Dates	Size
Afognak District								
	Waterfall Bay SHA <sup>a</sup>	251-84	Waterfall Bay	sockeye	Schrof	seasonally	6/1 - 7/1	600
	Foul Bay SHA <sup>a</sup>	251-41	Foul Bay	sockeye	Schrof	seasonally	6/1 - 6/9	600
	Kitoi Bay SHA <sup>a</sup>	252-32	Kitoi Bay	chum	Aro	seasonally	6/1 - 7/1	600
NW Kodiak District								
	Uganik/Viekoda/Kupreanof	253-11 - 253-35	Kodiak	sockeye	Foster	weekly	6/1 - 9/5	400
	Uyak Bay	254-10 - 254-40	Larsen Bay	sockeye	Foster	weekly	6/1- 9/5	400
	Spiridon Bay SHA/Telrod Cove <sup>b</sup>	254-50	Telrod Cove	sockeye	Duesterloh	weekly	7/15 - 9/15	240
SW Kodiak District								
	Karluk/Sturgeon	255-10, 255-20, 256-40	Larsen Bay	sockeye	Foster	weekly	6/1 - 9/5	400
	Halibut/Gurney	256-25 - 256-30	Lazy Bay (Alitak)	sockeye	Foster	weekly	6/23 - 8/1	400
	Inner/Outer Ayakulik	256-10 - 256-20	Kodiak	sockeye	Foster	weekly	6/1 - 8/1	400
Alitak Bay District								
	Alitak/Humpy-Deadman	257-10,20 257-50-70	Lazy Bay (Alitak)	sockeye	Foster	when available	6/5 - 8/31	400
	Moser/Olga	257-40 - 257-43	Kodiak	sockeye	Foster	weekly	6/5 - 8/31	400

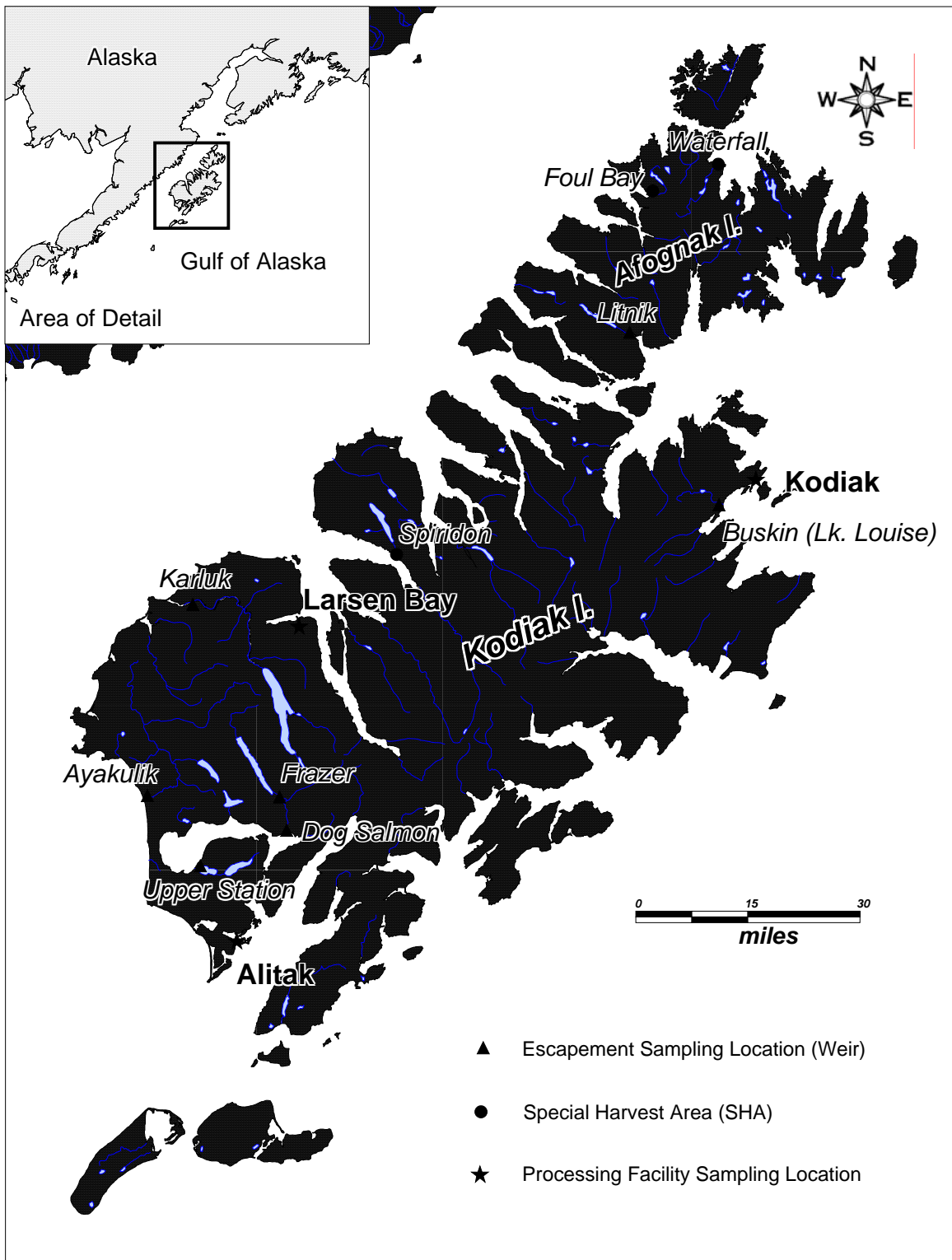
<sup>a</sup> Waterfall, Foul, and Kitoi bays special harvest areas (SHA) sample size is 600 fish total, frequency depending on harvest magnitude.

<sup>b</sup> Spiridon Bay SHA sample size is 240 fish per week (consistent with escapement sampling).



**Figure 1.**Map depicting the Kodiak Island Group and the Kodiak Management Area commercial salmon fishery districts, 2007.

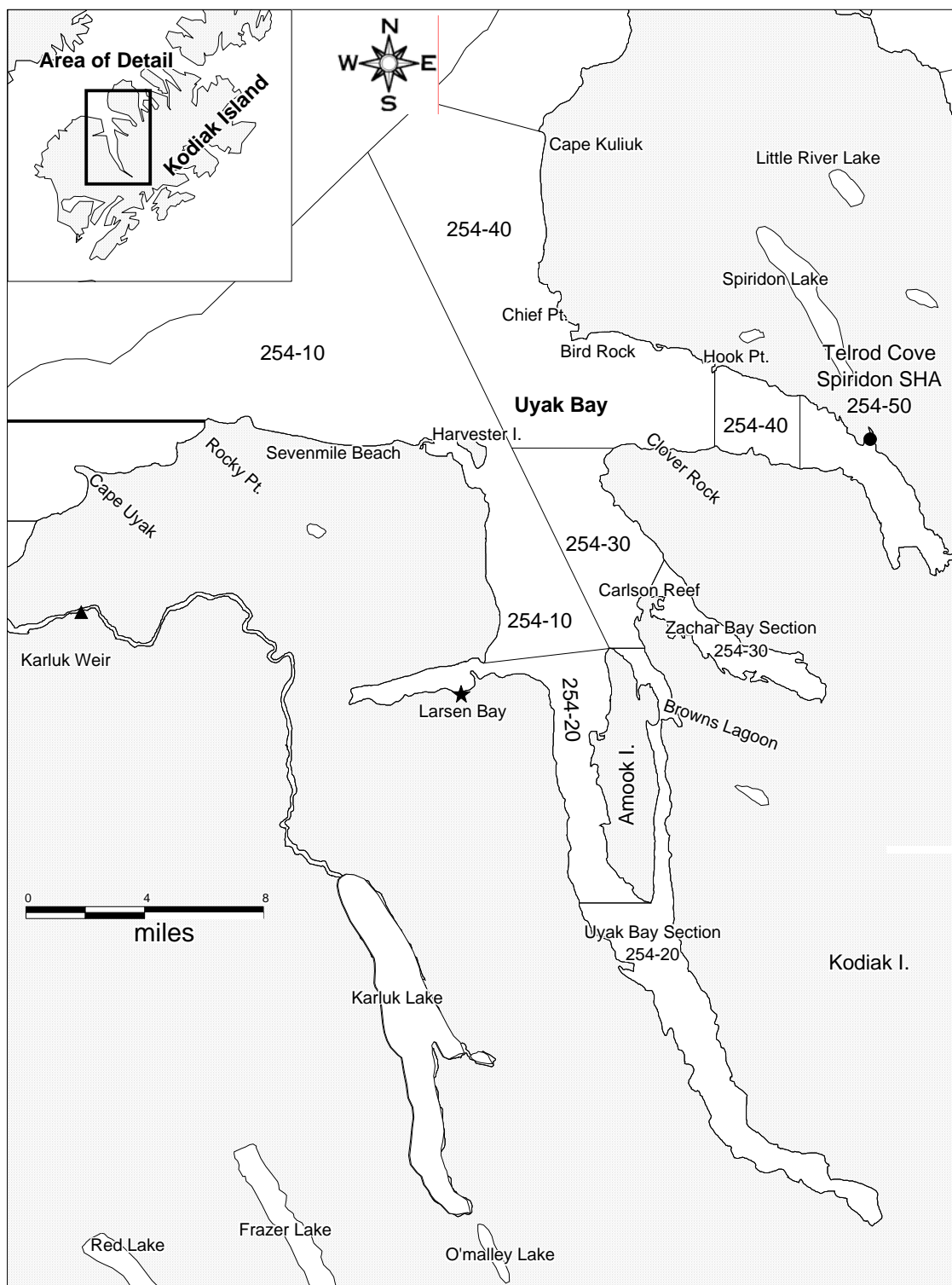




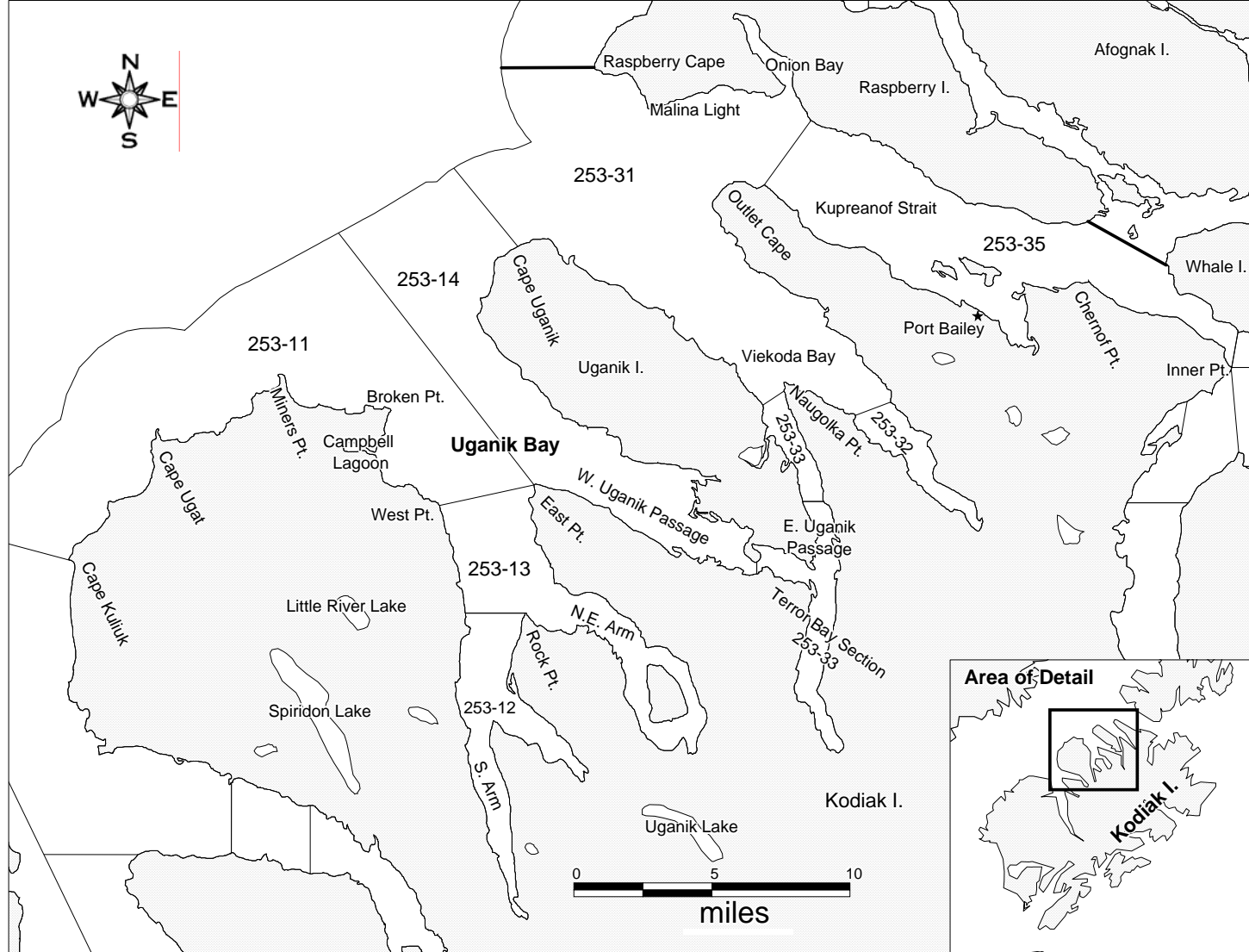
**Figure 2.**-Salmon escapement, special harvest area, and processing facility sampling locations in the Kodiak Management Area, 2007.



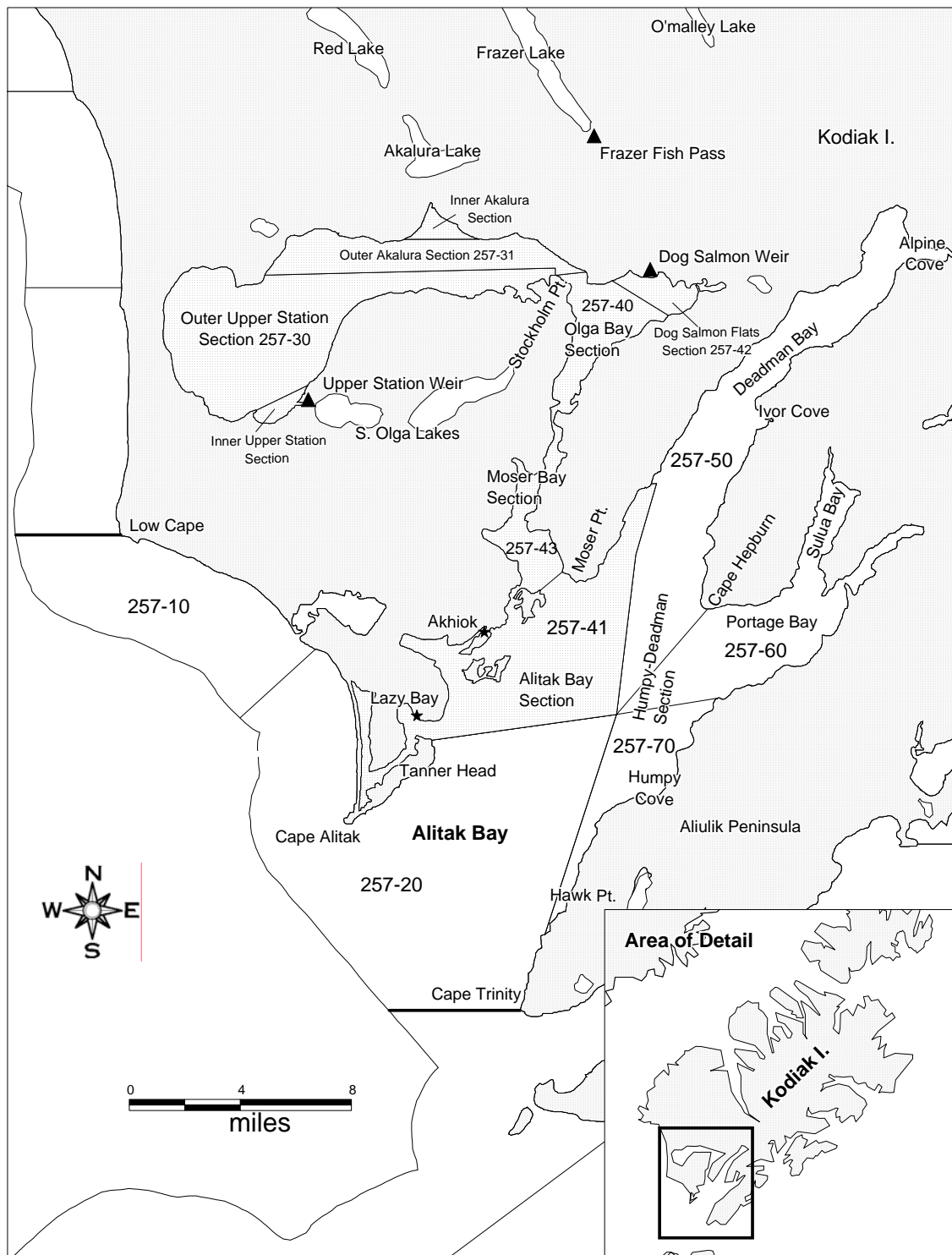
**Figure 3.**-The “Scott” six-panel adult salmon live box trap (photo taken at Upper Station weir).



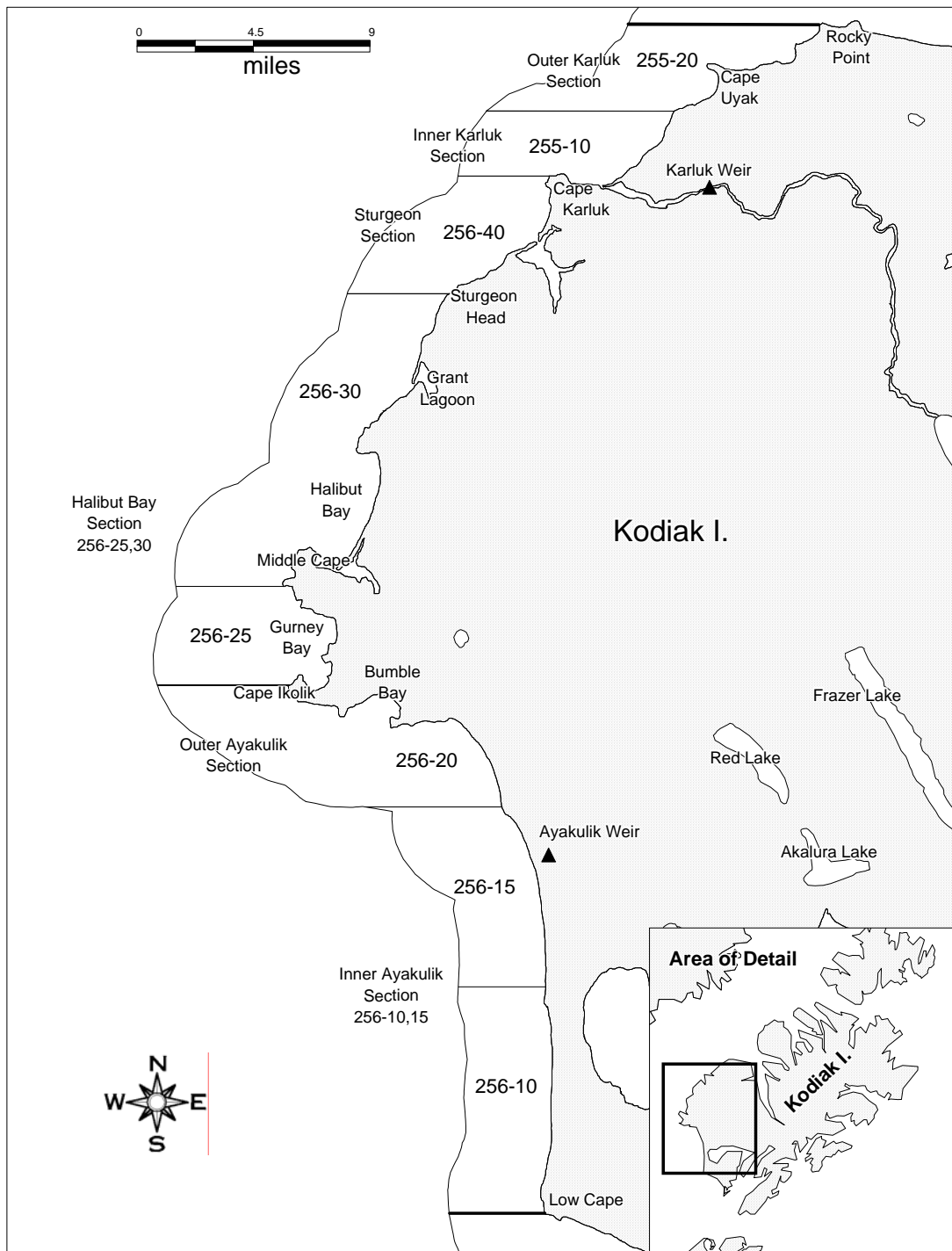
**Figure 4.-Kodiak Management Area commercial salmon statistical areas sampled to represent Uyak Bay harvest.**



**Figure 5.-Kodiak Management Area commercial salmon statistical areas sampled to represent Uganik/Viekoda/Kupreanof bays harvest.**

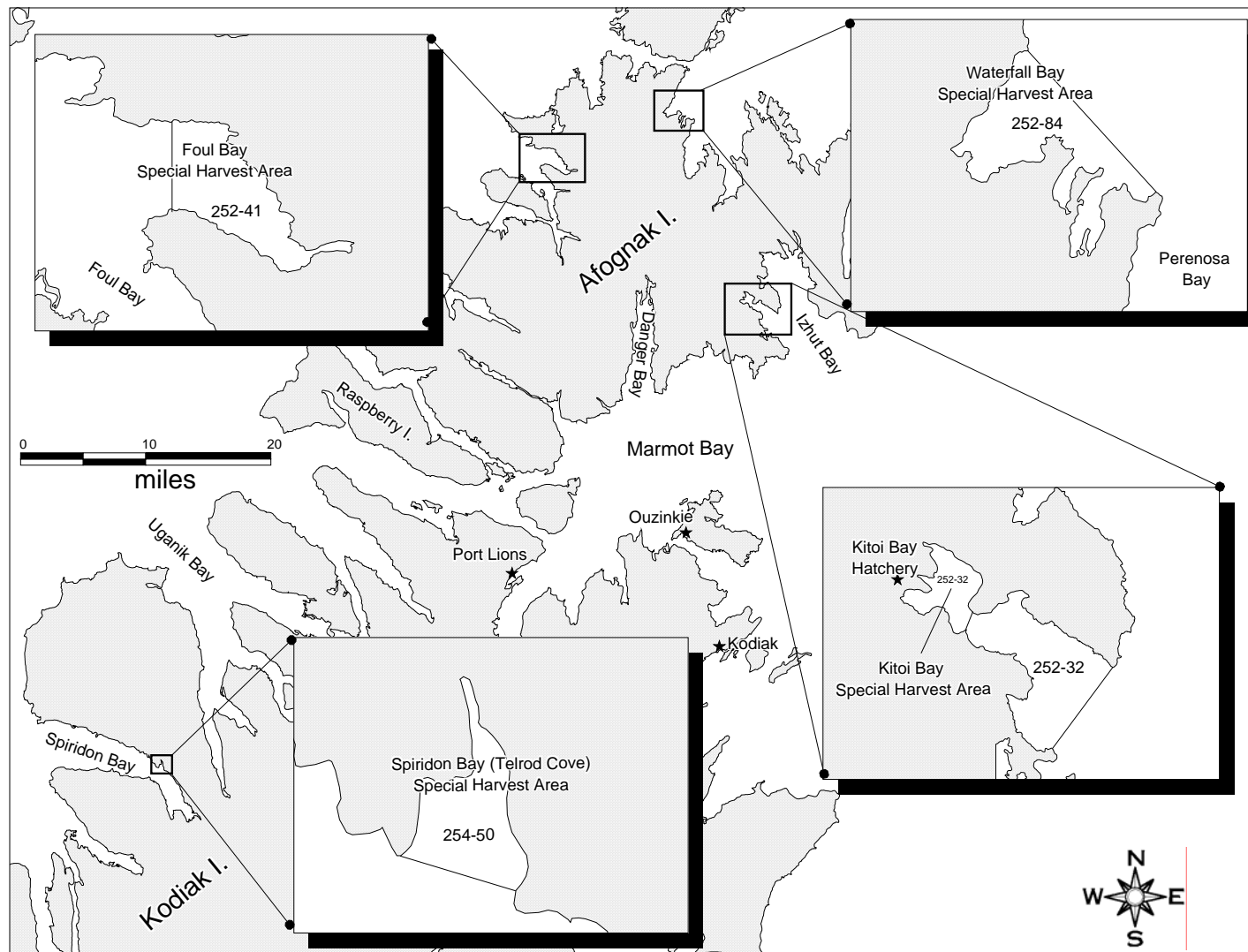


**Figure 6.-Kodiak Management Area commercial salmon statistical areas sampled to represent Moser/Olga gillnet (dotted) and Alitak seine area harvest.**



**Figure 7.-Kodiak Management Area commercial salmon statistical areas sampled to represent Southwest Kodiak District (Karluk/Sturgeon, Halibut/Gurney bays, and Ayakulik areas) harvests.**





**Figure 8.-Kodiak Management Area commercial salmon statistical areas sampled to represent Special Harvest Areas (SHA) at Waterfall, Foul, Kitoy, and Spiridon bays SHA.**





## **APPENDIX A. ADULT SALMON SAMPLING**

## **Appendix A1.-Procedure for sampling adult salmon for age, length, and sex.**

---

Annually, salmon escapements and catches are sampled for age (scales), length, and sex by field crews throughout the State. This database is essential for sound management of the State's salmon resources.

To be useful, data must be recorded on the age, sex, length (ASL) optical scanning (Opscan) **green** forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling adult salmon for age, length, and sex.

### **PROCEDURES**

#### **COMPLETING THE OPSCAN ASL FORMS:**

A completed OPSCAN form and accompanying scale gum card for sampling sockeye salmon are shown in Appendix A2.

Complete each section on the left side of the OPSCAN form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the OPSCAN forms, may not recognize partially filled circles. Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the OPSCAN form. Stray marks and scuffed OPSCAN forms can severely hamper scanning.

Fill out each of the following:

#### **Description**

Record the following: species/area/catch or escapement/gear type (if applicable)/samplers.

#### **Card**

The OPSCAN forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, district, and geographic location. Consult your crew leader for the current card number. Sockeye salmon scale samples will have only one gum card per OPSCAN form as shown in Appendix A2.

#### **Species**

Refer to the reverse side of the OPSCAN form for the correct one-digit code (e.g., sockeye = 2).

#### **Day, Month, Year**

Escapement sampling: Use appropriate digits for the date the fish are sampled.

Catch sampling: Use the date the fish were caught. If this differs from the sample date, note the sample date in the top margin.

#### **District**

List all districts in which the fish were caught. Consult your area statistical map or project leader for the appropriate district. If more than one district is represented, darken the corresponding circles of the district representing most of the catch and note the other catch areas in the top margin.

### **Subdistrict (Section)**

List all subdistricts in which the fish were caught. If the catch represents more than one section, list each section but do not darken the corresponding circles. Leave blank if the section is unknown.

### **Stream**

Leave blank for catch sampling;

Consult area statistical map for the appropriate stream number when collecting escapement samples.

### **Location**

List the appropriate code associated with the area the fish were sampled as shown in Appendix A4. For example, if the fish were sampled in the Port of Kodiak, the location code would be 031.

### **Period**

Escapement sampling: List the sample week in which the fish were sampled (Appendix A5.).

Catch sampling: List the sample week in which the fish were caught. If this differs from the week the fish were sampled, note this in the top margin.

### **Project and Gear**

Refer to the reverse side of the OPSCAN form for the correct code. For example, escapement samples collected at a weir would have a project code of 3 and a gear code of 19.

### **Mesh**

Leave blank unless specifically instructed by supervisor to do otherwise.

### **Type of length measurement**

Refer to the reverse side of the OPSCAN form for the correct code (e.g., mideye to tail fork = 2).  
Refer to Appendix A6.

### **Number of scales per fish**

Fill in the number of scales collected per fish. For sockeye, one scale per fish is collected unless otherwise instructed by supervisor.

### **# of cards**

# of cards always = 1 (each OPSCAN form has an individual and unique “litho code”).

If possible, keep the OPSCAN form litho codes in numerical order throughout the season and keep all forms flat, dry, and clean. Fish gurry and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

## **SCALE GUM CARDS**

A completed OPSCAN form and accompanying gum card for sampling sockeye salmon are shown in Appendix A2. When collecting two scales per fish, as with coho salmon sampling, follow the procedure illustrated in Appendix A3. Be sure to fill out the gum cards in pencil as shown in Appendix A2 and A3.

**Species**

Write out completely (e.g., sockeye).

**Locality**

Escapement sampling: Include the weir site followed by “escapement” (e.g., Karluk River escapement).

Catch sampling: Include the area(s) where the fish were caught followed by “catch” (e.g., Uganik Bay catch).

**Statistical Area Code**

Fill in the appropriate digits from the OPSCAN form. If catch samples are from a variety of statistical areas be sure to list each statistical area and approximate percentage from each (if available).

**Sampling date**

Escapement sampling: Fill in the date the fish were sampled.

Catch sampling: Fill in the date the fish were caught. The sample date, if different from the catch date, may be noted in “remarks”.

**Gear**

Write out completely. If catch samples include multiple gear types, be sure to list each gear and approximate percentage from each (if available).

**Collector(s)**

Record the last names of each person collecting the sample.

**Remarks**

Record any pertinent information such as the number of scales per fish sampled, processing facility where the sampling took place, vessel/tender name, etc. Be sure to transfer this information to the top margin of the OPSCAN form.

## SAMPLING PROCEDURE

1. Place the fish on its right side to sample the left side.
2. Determine the sex of the fish (escapement sampling only) and darken M or F in the sex columns. If any difficulty is encountered with this procedure, write "I had trouble sexing these fish" on the top margin of the OPSCAN form and ask your supervisor for help as soon as possible before sexing additional fish.
3. Measure fish length in millimeters from mid-eye to tail fork (escapement sampling only; Appendix A6). Record length by blackening the appropriate column circles on the OPSCAN form. Column 3 on the OPSCAN form is used for fish with a length greater than 999 millimeters (Chinook). Measure all species of salmon to the nearest mm. When collecting length data, take care to ensure that each length corresponds to the appropriate scale mounted on the gum card, as length-at-age is evaluated for each sample.

4. Remove the "preferred scale" from the fish by grasping the scale's exposed posterior edge with forceps and pulling free (Appendix A7). Remove all slime, grit, and skin from the scale (neoprene wristers work well for this). The preferred scale is located on the left side of the fish, two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin. If the preferred scale is missing, select a scale within the preferred area on the other side of the fish. If no scales are present in the preferred area on either side of the fish, sample a scale as close to the preferred area as possible and darken the 8 under "age error code" on the OPSCAN form. Do not select a scale located on the lateral line.
5. It is important to take care that scales adhere to the gum card, rough side up. Therefore, without turning the forceps over, clean, moisten, and mount the scale on the gum card with your thumb or forefinger. Exert just enough pressure to spread and smooth the scales directly over the number as shown in Appendix A7. The ridges on the sculptured side can be felt with a fingernail or forceps. Mount the scale with the anterior end oriented toward top of gum card. All scales should be correctly oriented on the card in the same direction (Appendix A8.).
6. Repeat steps 1 through 4 for up to 40 fish on each OPSCAN form.
7. When sampling at weirs you may use "Rite in the Rain"® books to record the data. Keep the OPSCAN forms in camp where they will be clean, dry, and flat. After sampling is done for the day, transfer the data to the OPSCAN forms. **Each length, sex, and scale must correspond to a single fish! It is the responsibility of the crew leader to be sure the data has been transcribed correctly and the OPSCAN forms filled out completely.** Log books containing length and sex data should be returned to Matt Foster at the end of the season. These are considered raw data and need to be archived. If you choose to record raw data on tape, these tapes must be returned to Matt Foster.

### SAMPLING CHECKLIST

OPERATIONAL PLAN	PENCILS (NO. 2)
GUM CARDS	FORCEPS
OPSCAN FORMS ( <b>GREEN</b> )	PLASTIC CARD HOLDERS
NEOPRENE WRISTERS	CLIPBOARD
MEASURING BOARD	LOG BOOK (Rite-in-the Rain)

### SOME REMINDERS

1. For greater efficiency in scale reading, mount scales with anterior end toward top of gum card.

2. OPSCAN forms should be carefully edited. Remember to use the new OPSCAN forms (green) as the red and blue forms are outdated. Re-check header information on OPSCAN forms; make sure all available information is filled in. Take extra care to use the correct period code (sampling week) for the sampling or catch date. OPSCAN form numbers should not be repeated; a frequent error is to begin a week's sample with the last OPSCAN number used the week before. This is particularly important if the data is regularly sent to town; it is easy to forget which OPSCAN form numbers were used. Crew leaders should take time to ensure that the circles are being blackened correctly. If the circles are sloppily marked, the optical scanner records the information incorrectly or misses it entirely.
3. Transfer important comments from the gum cards to the OPSCAN forms. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top right margin. If there is not room on the OPSCAN form to completely explain the remarks, use a separate piece of paper.
4. Never put data from different dates on one OPSCAN form or one gum card. Even if only one scale is collected that day, begin a new OPSCAN form and gum card the next day.
5. If weights are taken, they may be noted in the right margin of the OPSCAN form during sampling, but be sure to transfer the weights and litho code to the appropriate columns on the reverse of the OPSCAN form before submitting it to your supervisor.
6. Try to keep the litho codes (located in the left margin of the OPSCAN form) in numerical order. This should not be hard to do if they are arranged that way before page numbering. When sampling different areas throughout the season, arrange the litho codes in order before each sample is taken.
7. If OPSCAN forms get wrinkled or splotched the data should be transcribed onto a new OPSCAN form prior to sending in. The optical scanning computer will misread or reject torn or wrinkled sheets. Do not use paperclips on OPSCAN forms.
8. Be careful when collecting and mounting scales in wet conditions (rain, high humidity, etc.). If glue dries on top of the scale, it often obscures scale features, resulting in an unreadable scale. In addition, scales frequently adhere poorly to a wet gum card. Protect the cards and keep them dry to avoid having to remount the scales on a new card. If the cards get wet, try to dry them in a protected area or remount if necessary. Remember, use a pencil when filling out gum cards, because ink will come off during pressing.
9. Visually scan all OPSCAN forms for mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475mm fish in the 100s column with nothing in the 10s column.
10. Avoid accumulation of incomplete OPSCAN forms. In previous years, there have been cases where individuals have completed several samples before transcribing the information on the OPSCAN forms. This may lead to an increase in errors. After a sample has been completed, try to get the OPSCAN forms filled out as soon as possible. This will ensure more accurate information, as any problems or abnormalities concerning

the sample (e.g., many jacks in sample, many fish lacking preferred scale, number of scales do not match number of lengths recorded, etc.) will be fresh in your mind.

11. Responsibility for accuracy lies first with the primary data collector(s) and finally with the crew leader. Sloppy or incomplete data forms or gum cards will be returned to individual collectors for correction.

**Appendix A2.-Completed adult salmon OPSCAN form (front side) and associated gum card.**

Species: Sockeye Card No: 014

Locality: Frazer Esc.

Stat. Code: 257-40-403

Sampling Date: Mo. 06 Day 07 Year 2000

Gear: Weir/Trap

Collector(s): D. Roberts, C. Selby

Remarks: \_\_\_\_\_

DESCRIPTION: Sockeye \ Frazer \ Esc.

CARD: 014

SPECIES: Sockeye

DAY: 07

MONTH: 06

YEAR: 2000

DISTRICT: 257

SUBDISTRICT: 40

STREAM: 403

LOCATION: 038

PERIOD: 24

PROJECT: 3

GEAR: 19

MESH: \_\_\_\_\_

TYPE OF LENGTH MEASUREMENT: 2

NUMBER SCALES/ FISH: 1

# OF CARDS: 1

Samplers: Roberts, Selby

ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1	M	1	2	3	4	5
2	F	1	2	3	4	5
3	F	1	2	3	4	5
4	F	1	2	3	4	5
5	F	1	2	3	4	5
6	M	1	2	3	4	5
7	M	1	2	3	4	5
8	F	1	2	3	4	5
9	F	1	2	3	4	5
10	F	1	2	3	4	5
11	F	1	2	3	4	5
12	M	1	2	3	4	5
13	M	1	2	3	4	5
14	M	1	2	3	4	5
15	F	1	2	3	4	5
16	F	1	2	3	4	5
17	M	1	2	3	4	5
18	M	1	2	3	4	5
19	M	1	2	3	4	5
20	F	1	2	3	4	5
21	F	1	2	3	4	5
22	M	1	2	3	4	5
23	F	1	2	3	4	5
24	F	1	2	3	4	5
25	M	1	2	3	4	5
26	F	1	2	3	4	5
27	M	1	2	3	4	5
28	M	1	2	3	4	5
29	M	1	2	3	4	5
30	F	1	2	3	4	5
31	F	1	2	3	4	5
32	F	1	2	3	4	5
33	M	1	2	3	4	5
34	M	1	2	3	4	5
35	F	1	2	3	4	5
36	F	1	2	3	4	5
37	M	1	2	3	4	5
38	F	1	2	3	4	5
39	F	1	2	3	4	5
40	M	1	2	3	4	5

DO NOT WRITE IN THIS MARGIN

15429

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**Appendix A3.-Assigned port and weir location codes.**

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**PORT AND LOCATION CODES**

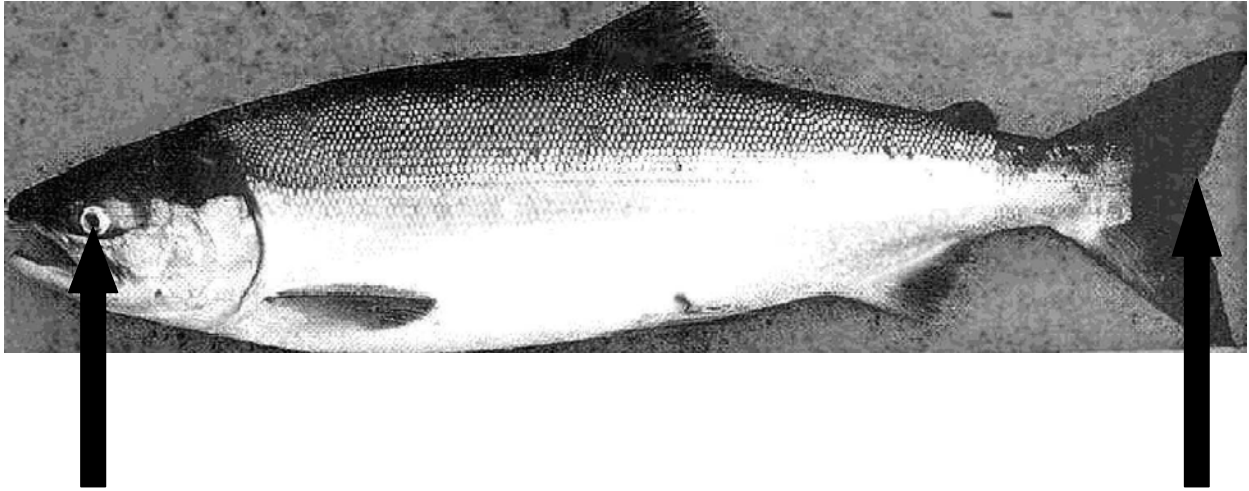
029	Uganik	048	Waterfall Bay
030	Lazy Bay	049	Little River
031	Port of Kodiak	050	King Cove
032	Pauls Lake	051	Port Moller
033	Thorsheim	052	Dutch Harbor
034	Afognak River	053	Akutan
035	Karluk River	054	Sand Point
036	Ayakulik (Red River)	055	Bear River
037	Upper Station	056	Nelson River
038	Frazer Lake	057	Canoe Bay
039	Dog Salmon	058	Ilnik Lagoon
040	Akalura River	059	Orzinski River
041	Uganik River	060	Sandy River
042	Malina Creek	061	Thin Point Lagoon
043	Portage Lake	062	Middle Lagoon
044	Foul Bay	070	Black Lake
045	Larsen Bay	071	Chignik Weir
046	Spiridon	072	Chignik (Processing facilities)
047	Little Kitoi		

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**Appendix A4.-**Sampling weeks and associated calendar dates, 2007.

Week	Calendar Dates	Week	Calendar Dates
10	1-Mar - 7-Mar	28	5-Jul - 11-Jul
11	8-Mar - 14-Mar	29	12-Jul - 18-Jul
12	15-Mar - 21-Mar	30	19-Jul - 25-Jul
13	22-Mar - 28-Mar	31	26-Jul - 1-Aug
14	29-Mar - 4-Apr	32	2-Aug - 8-Aug
15	5-Apr - 11-Apr	33	9-Aug - 15-Aug
16	12-Apr - 18-Apr	34	16-Aug - 22-Aug
17	19-Apr - 25-Apr	35	23-Aug - 29-Aug
18	26-Apr - 2-May	36	30-Aug - 5-Sep
19	3-May - 9-May	37	6-Sep - 12-Sep
20	10-May - 16-May	38	13-Sep - 19-Sep
21	17-May - 23-May	39	20-Sep - 26-Sep
22	24-May - 30-May	40	27-Sep - 3-Oct
23	31-May - 6-Jun	41	4-Oct - 10-Oct
24	7-Jun - 13-Jun	42	11-Oct - 17-Oct
25	14-Jun - 20-Jun	43	18-Oct - 24-Oct
26	21-Jun - 27-Jun	44	25-Oct - 31-Oct
27	28-Jun - 4-Jul	45	1-Nov - 7-Nov

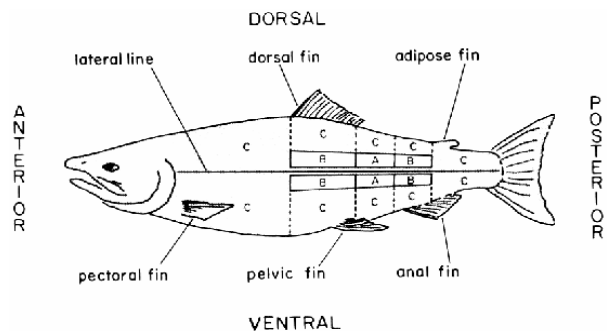
**Appendix A5.-Measuring fish length from mideye to tail fork.**



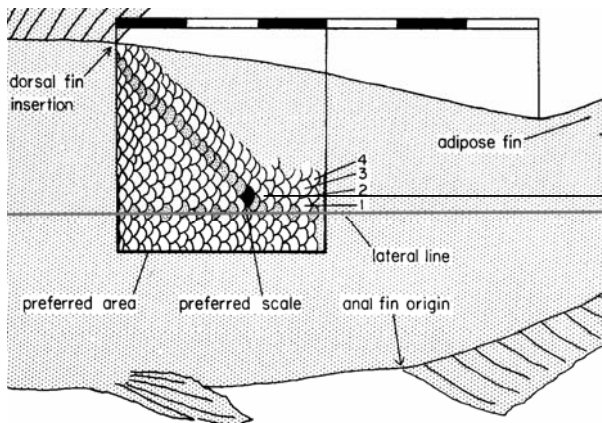
Adult salmon length is measured from mideye to tail fork because the shape of the salmon's snout changes as it approaches sexual maturity. The procedure for measuring by this method is as follows.

- 1) Place the salmon flat on its right side (on the measuring board) with its head to your left and the dorsal fin away from you.
  - 2) Slide the fish in place so that the middle of the eye is in line with the edge of the meter stick and hold the head in place with your left hand.
  - 3) Flatten and spread the tail against the board with your right hand.
  - 4) Read and record the mideye to tail fork length to the nearest millimeter.
-

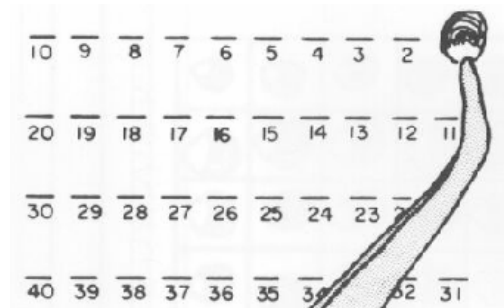
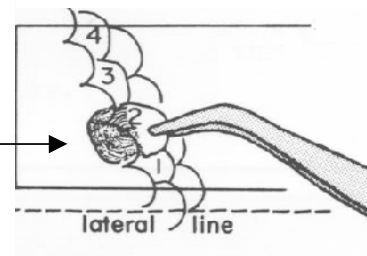
**Appendix A6.-Removal and mounting of the preferred salmon scale.**



INPFC rated areas for scale removalArea A is the preferred area. If scales on the left side are missing, try the right side. Area B is the second choice if there are no scales in area A on either side of the fish. Area C designates non preferred areas.

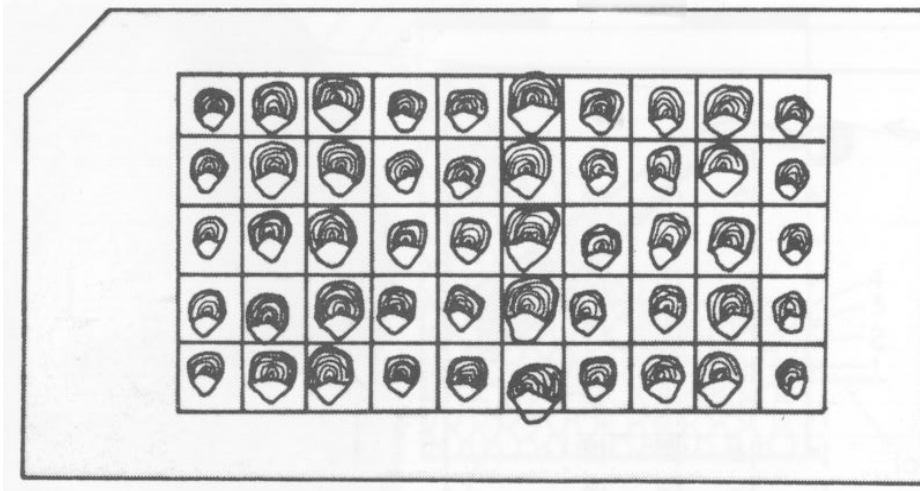


Do not turn scale over.

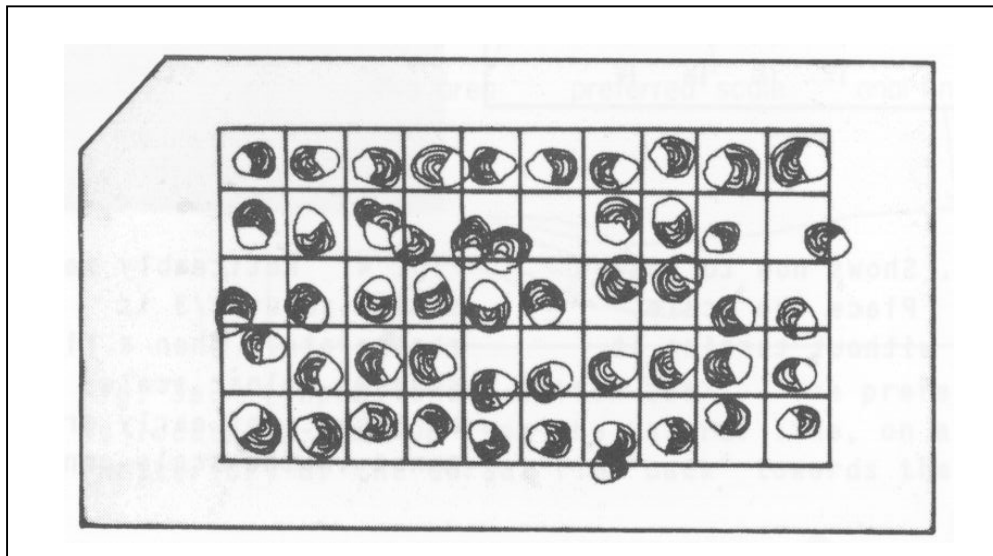


The preferred scale in this diagram is solid black. It is located 2 rows up from the lateral line, on a diagonal from the insertion (posterior) of the dorsal fin “back” toward the origin of the anal fin.

**Appendix A7.-Scale orientation on the salmon scale gum card.**



The scales are all correctly oriented on the card in the same direction, with the anterior portion of the scale pointed toward the top of the card and the posterior portion ( which is that portion of the scale held in the forceps) pointed toward the bottom of the card.



The scales are incorrectly oriented in different directions. This increases the time spent to age samples.

# Frazer Lake Operational Plan

by

**Rob Baer**

May 2007

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Alaska Department of Fish and Game

Division of Commercial Fisheries



## Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mid-eye-to-fork	MEF
gram	g	all commonly accepted		mid-eye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	<b>Mathematics, statistics</b>	
meter	m			<i>all standard mathematical</i>	
milliliter	mL	at	@	<i>signs, symbols and</i>	
millimeter	mm	compass directions:		<i>abbreviations</i>	
		east	E	alternate hypothesis	H <sub>A</sub>
		north	N	base of natural logarithm	<i>e</i>
		south	S	catch per unit effort	CPUE
		west	W	coefficient of variation	CV
		copyright	©	common test statistics	(F, t, $\chi^2$ , etc.)
		corporate suffixes:		confidence interval	CI
		Company	Co.	correlation coefficient	
		Corporation	Corp.	(multiple)	R
		Incorporated	Inc.	correlation coefficient	
		Limited	Ltd.	(simple)	r
		District of Columbia	D.C.	covariance	cov
		et alii (and others)	et al.	degree (angular)	°
		et cetera (and so forth)	etc.	degrees of freedom	df
		exempli gratia		expected value	<i>E</i>
		(for example)	e.g.	greater than	>
		Federal Information		greater than or equal to	≥
		Code	FIC	harvest per unit effort	HPUE
		id est (that is)	i.e.	less than	<
		latitude or longitude	lat. or long.	less than or equal to	≤
		monetary symbols		logarithm (natural)	ln
		(U.S.)	\$, ¢	logarithm (base 10)	log
		months (tables and		logarithm (specify base)	log <sub>2</sub> , etc.
		figures): first three		minute (angular)	'
		letters	Jan,...,Dec	not significant	NS
		registered trademark	®	null hypothesis	H <sub>0</sub>
		trademark	™	percent	%
		United States		probability	P
		(adjective)	U.S.	probability of a type I error	
		United States of		(rejection of the null	
		America (noun)	USA	hypothesis when true)	$\alpha$
		U.S.C.	United States	probability of a type II error	
			Code	(acceptance of the null	
		U.S. state	use two-letter	hypothesis when false)	$\beta$
			abbreviations	second (angular)	"
			(e.g., AK, WA)	standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var
<b>Weights and measures (English)</b>					
cubic feet per second	ft <sup>3</sup> /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
nautical mile	nmi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
<b>Time and temperature</b>					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
degrees kelvin	K				
hour	h				
minute	min				
second	s				
<b>Physics and chemistry</b>					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt,				
	‰				
volts	V				
watts	W				

# **FRAZER LAKE OPERATIONAL PLAN**

by

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Kodiak, Alaska 99615

May 2007



The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric, and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: <http://www.sf.adfg.ak.us/statewide/divreports/html/intersearch.cfm>.

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# TABLE OF CONTENTS

	Page
LIST OF FIGURES .....	iii
LIST OF APPENDICES .....	iii
ABSTRACT .....	1
INTRODUCTION.....	1
PROJECT OBJECTIVES .....	2
SUPERVISION AND TRAINING .....	2
SMOLT MONITORING PROCEDURES .....	2
Objectives .....	2
Tasks.....	2
Trap Catch .....	3
Seine Catch .....	3
Species Identification .....	3
Age, Weight, and Length Sampling.....	3
Smolt Diversion and Bypass Pilot Study .....	3
Passive diversion of smolt .....	4
Active diversion of smolt and water .....	4
Movement of smolt into a bypass pipeline .....	4
Enumeration system.....	5
Climate Data .....	5
Termination of Smolt Monitoring.....	5
FISH PASS OPERATION AND ADULT SAMPLING .....	5
Objectives .....	5
Tasks.....	5
Fish Pass Procedures .....	5
Escapement Sampling.....	6
OTHER REQUIREMENTS .....	6
Safety.....	6
Training .....	7
Radio Schedule.....	7
Air Charters .....	7
Reporting .....	7
Photo Documentation .....	7
Timesheets.....	7
Purchasing .....	8
Visitors / Public Interaction.....	8
Camp Inventory and Close Up .....	8
REFERENCE CITED.....	8
FIGURES .....	11
APPENDIX A. SMOLT AGE-WEIGHT-LENGTH (AWL) SAMPLING MATERIALS AND METHODS .....	17

## TABLE OF CONTENTS (Continued)

	<b>Page</b>
APPENDIX B. FISH PASS MAINTENANCE AND OPERATION .....	27
APPENDIX C. SATELLITE TELEPHONE AND DISPATCH INSTRUCTIONS .....	31
APPENDIX D. WEEKLY REPORT EXAMPLE.....	35
APPENDIX E. TIMESHEET INSTRUCTIONS .....	37

## LIST OF FIGURES

Figure	Page
1. Location of Frazer Lake on Kodiak Island, Dog Salmon Creek and the Barrier Falls (camp site). .....	12
2. Weather observation form. ....	14

## LIST OF APPENDICES

Appendix	Page
A1. Smolt age-weight-length (AWL) sampling materials and methods. ....	18
A2. Procedure for recording salmon smolt age-weight-length data on AWL forms. ....	20
A3. Example of an AWL form filled out for smolt sampled. Note: Project code should be 8 not 4. ....	22
A4. Photo of a smolt with the preferred area highlighted. ....	23
A5. An example of 2 correctly labeled smolt slides. This represents fish 1 through 10 from a sample collected on 5/11/00. ....	24
A6. Sampling weeks and associated calendar dates. ....	25
 B1. Fish pass maintenance and operation. ....	 28
C1. Satellite telephone and dispatch instructions. ....	32
D1. An example of a weekly report. ....	36
 E1. Instructions for filling out a timesheet. ....	 38
E2. Example of a completed timesheet. ....	39



## ABSTRACT

The Frazer Lake system, within the Kodiak Management Area, was originally void of anadromous fish species due to a 10-meter barrier falls. From 1951-1971 juvenile and adult sockeye salmon *Oncorhynchus nerka* were introduced to Frazer Lake. In 1962 a fish pass was constructed around the barrier fall to allow for fish to migrate up into the lake system. Since construction of the fish pass the Alaska Department of Fish and Game (ADF&G) has annually operated and maintained the fish pass and its supporting structures to monitor and enumerate the sockeye salmon and ensure unobstructed escapements. Additionally the field staff collects biological data from the sockeye salmon smolt outmigration. This operation plan is intended to provide the field staff with a reference for the daily operations of the Frazer Lake fish pass and smolt operations during the 2007 field season.

Key words: Frazer, Dog Salmon, Olga Bay, Sockeye Salmon, *Oncorhynchus nerka*, smolt, fish pass, bypass, fish ladder, weir.

## INTRODUCTION

Frazer Lake is located on the southern end of Kodiak Island and is the second largest lake within the Kodiak Archipelago. Frazer Lake is 14.2 km long, and 1.6 km wide, with a surface area of 16.1 km<sup>2</sup> (Figure 1). Dog Salmon Creek is the outlet to Frazer Lake and drains into Olga Bay. Prior to 1951, Frazer Lake was void of sockeye salmon *Oncorhynchus nerka* because of a 10-meter barrier falls, which prohibited anadromous fish from entering the lake (Russell 1972). Egg, fry, and adult transplants (1951-1971) from sockeye salmon systems on Kodiak Island (Karluk and Red Lakes) and the Alaska Peninsula (Becharof Lake) established a sockeye salmon run to the Frazer system with adults returning for the first time in 1956 (Russell 1972). From 1956-1961, returning adults were backpacked around the falls and, in 1962, a fish pass was constructed to provide access to the lake environment. A second fish pass was installed in 1979, allowing for increased fish passage during peak migration periods.

In 1983, a weir was installed on Dog Salmon Creek, located 0.7 km upstream from lower Olga Bay. The purpose for the Dog Salmon weir was to provide more timely sockeye, chum *O. keta*, and pink salmon *O. gorbuscha* escapement counts to more effectively manage the commercial fishery.

Conservative fishery management practices have been very successful at building the Frazer Lake run from 25,000 sockeye salmon in 1971 to 645,739 fish in 1985. Blackett (1979) established an escapement goal of 383,000 adults based upon limnological and spawning habitat information. Subsequent declines in smolt condition, and shifts in zooplankton size and community composition prompted lowering of the escapement goal to 200,000-275,000 adults in 1986 (Kyle et al. 1988). The goals were lowered again to 140,000-200,000 in 1988 (Nelson and Lloyd 2001). Fertilizer (a mixture of nitrogen and phosphorous) was applied to the lake from 1988-1992 in an attempt to increase survival of lake rearing sockeye salmon fry. This program was instituted in response to dramatic declines in smolt size resulting from high escapements into the lake that occurred during 1980-1982 and 1985. The escapement goal has since been changed to a biological escapement goal (BEG) of 70,000-150,000 (Nelson et al. 2005).

The Frazer Lake sockeye salmon stock is now considered of major importance to the island-wide salmon fishery. Also, this introduced run provides for an enhanced food resource for the local Kodiak Island brown bear population, resulting in higher bear densities along Frazer Lake and Dog Salmon Creek.

Sockeye salmon adult enumeration and age, length and sex sampling has been conducted at the Frazer Lake fish pass since 1956. Spawning ground surveys have been performed since 1964. Since 1985, smolt emigration timing and magnitude and zooplankton density and community composition have been measured (Sagalkin 1999). This document provides a description of the current research conducted at Frazer Lake and specific methods used for data collection.

## **PROJECT OBJECTIVES**

The ADF&G's goals for the Frazer Lake project are to optimize natural sockeye salmon production and to collect data relevant to generating accurate preseason run forecasts and escapement goal evaluations. Specific objectives are:

1. Determine sockeye salmon smolt condition and age composition.
2. Determine the feasibility of operating a pipeline bypass system for out migrating smolt with the potential of 100% smolt capture and enumeration through the existing fish pass structures.
3. Provide unobstructed and timely adult fish passage into Frazer Lake.
4. Determine escapement timing and magnitude of adult sockeye salmon.
5. Collect age, length, and sex (ALS) data from the adult sockeye salmon escapement, and age, weight, and length (AWL) data from the sockeye salmon smolt emigration.

## **SUPERVISION AND TRAINING**

The project biologist is Rob Baer (Fishery Biologist II), Nathan Shoutis (Fish and Wildlife Technician III) will be the crew leader and Ryan Cooper (Fish and Wildlife Technician II) will be the supporting crew. The crew leader is responsible for scheduling daily work assignments, ensuring that collected data adhere to plan standards, and ensuring that safety is a priority.

## **SMOLT MONITORING PROCEDURES**

### **OBJECTIVES**

1. Estimate sockeye salmon smolt age composition, average smolt length, weight, and condition factor.
2. Determine the feasibility of utilizing the current water diversion and fish pass infrastructure as a smolt outmigration bypass and enumeration system.

### **TASKS**

1. Operate the inclined plane trap three days a week throughout the sockeye salmon smolt emigration.
2. Sample 40 sockeye salmon smolt every other day for a total of 120 samples per week, for age, weight, and length measurements throughout the emigration.
3. Through the use of an in river beach seine collect 40 sockeye salmon smolt 'grab' samples independent of the trap once per week.
4. Conduct trial field experiments to determine efficient, effective and safe methods for smolt diversion, transportation and enumeration.

## TRAP CATCH

A single incline plane trap will be installed (Todd 1994) approximately 130 m upstream of the fish pass diversion weir. Document the location of the location of the trap. If the trap is repositioned or lead material is added or removed, notify the project biologist, and document the changes in the comment section of the *Sockeye Salmon Smolt Monitoring Form* (Figure 2). The trap will be fished every other day to randomly collect 40 sockeye salmon smolt a day for a total of 120 smolt samples per stat week (Appendix A6). The objective is to collect smolt that represent the outmigration for that day. While the trap is fishing it must be closely monitored to ensure it is operating properly and it is not overcrowding the smolt. Record trap start and stop times. While the trap is not operational, the back of the trap box must be removed and the trap made inoperable to eliminate any undue stress or mortality to migrating smolt.

## SEINE CATCH

Independent of the trap catch, a small meshed beach seine will be used to collect additional smolt for sampling. The beach seine will be used anywhere within the Frazer river from the lake outlet to the diversion weir. Sets should be made on either visually targeted schools of out migrating smolt or blind sets in areas of the system where smolt may temporarily hold through the migration. The goal is to collect beach seined smolt for comparisons against the inclined plane trap catches.

## SPECIES IDENTIFICATION

Proper identification of sockeye salmon smolt is crucial. A helpful source for juvenile salmonids is the 'Field Identification of Coastal Salmonids' by Pollard et. al. (1997). It is the responsibility of the crew leader to ensure species are properly identified.

## AGE, WEIGHT, AND LENGTH SAMPLING

From the trap catches 40 sockeye smolt every other day need to be sampled for age, weight, and length. A total of 120 trap caught smolt will be sampled per statistical week. If sampling objectives are being met, collect samples of 40 fish on Monday, Wednesday and Friday. Additional age, weight, length samples need to be obtained from the seine catch. Once a week, 40 seine catch samples should be collected on the same day in which trap samples are collected. Specific procedures for collecting and recording the information are in Appendix A. Each sample should be taken from a single day's catch. Do not mix samples between days. If less than 40 fish are caught in a day, the sample size for that day will be the number of fish caught on that day. **Smolt primarily emigrate at night, so a single sampling day is the 24-hour period from noon to noon and is identified by the calendar date corresponding to the first noon.**

## SMOLT DIVERSION AND BYPASS PILOT STUDY

A portion of the 2007 field season will be dedicated to evaluating the feasibility of operating a smolt enumeration system that diverts a portion or all of the out migrating smolt into a pipeline bypass structure that is integrated into the current infrastructure. The feasibility of a smolt bypass system will be determined by examining fish behavior and water dynamics as they relate to the current Frazer River infrastructure. All testing and experimentation will be conducted only when constant monitoring can occur so as not to cause any smolt mortality. This pilot study process will be broken down into four sections;

1. Passive diversion smolt
2. Active diversion of smolt and water



3. Movement of smolt into a bypass pipeline
4. Enumeration system

Success of each study section will be determined by careful visual observations of the intended path of smolt diversion as well as down stream observations identifying fish escaping through the diversions. Successful diversion systems will not allow any healthy outmigrating smolt through the diversion device. Consecutive sections of the project will only begin after the prior section is deemed successful through the visual observations. Because this first year is designed to be a feasibility study it will not involve a comprehensive assessment of diversion efficiency. If the entire project is deemed feasible a more comprehensive diversion efficiency test will be employed in the following year.

### **Passive diversion of smolt**

The first section of this study is intended to divert the smolt without restricting and disturbing a larger percentage of the river flow. Throughout the smolt outmigration period the existing concrete infrastructure above the waterfall will be utilized for this experiment. An effective method of passively diverting out migrating smolt from the middle and left portion of the river over to the right bank of the river (closer to the inlet of the fish pass) will be tested. Various methods to be tested include;

- flashers suspended in the water column which are allowed to rotate and spin
- fixed flashers on the substrate
- predatory decoys (fish, owls, snakes, etc.)
- active air line creating constant bubble stream
- acoustical
- lights illuminating the diversion zone, and/or incorporated with the flashers
- any other creative idea the field crew can design and develop are open for experimentation as long as personal safety and smolt mortality are the prime considerations.

### **Active diversion of smolt and water**

Once the smolt are passively diverted from the left half of the river and moved over to the right side of the river they will then need to be moved into a smaller section of the river. This will require the appropriate balance of water volume and velocity to successfully move smolt into the primary holding/consolidation tank. The passive and active diversion devices should overlap to ensure smolt do not get through the diversion. This portion of the experimentation will require weir paneling with appropriate sized perforations to allow for adequate dewatering and yet create sufficient water velocity.

### **Movement of smolt into a bypass pipeline**

The third section of the study is expected to be the most challenging. An 8" poly pipe will be inserted into one of the outside two fish passes and used as the fish transporting line down to the bottom of the fish pass outlet. For the 2007 season a small section of pipe would be temporarily used to test and run trial experiments for evaluating water movement into the pipe line. This phase of the system will involve significant amounts of dewatering and consolidation of fish in

an efficient and safe manner. The highly successful Spiridon Lake bypass system should be used as a model when developing tests and trials (Duesterloh and Watchers 2007).

### **Enumeration System**

Tests for the enumeration portion of the project are not expected to be obtained in this first year of bypass analysis. The primary goal for 2007 is to establish the feasibility of having the smolt moved into the diversion system. If the prior sections of this pilot study prove successful a preliminary enumeration plan and design for the system may be developed if time permits.

### **CLIMATE DATA**

Collect climate data at approximately the same time every day. Record the information on the *Climate Observation Form*. These data include water and air temperatures (°C), stream height (cm), estimated percent cloud cover, and wind direction and velocity (Figure 3). Measure stream height from a stream gauge in the stream in a location not directly affected by the trap, generally upstream a few meters.

### **TERMINATION OF SMOLT MONITORING**

Remove the smolt trap at Frazer Lake at the end of the smolt emigration, which is expected to be approximately 30 June. The exact date for trap removal will be determined by the project biologist based on trap catch rate performance compared to previous years and consultation with the field crew.

## **FISH PASS OPERATION AND ADULT SAMPLING**

### **OBJECTIVES**

1. Enumerate adult salmon escapement into Frazer Lake.
2. Estimate sockeye salmon average length and sex (ALS) ratios by age class.
3. Monitor escapement quality with respect to numbers of net-marked and “jack” sockeye salmon and identify sockeye salmon with a clipped adipose fin within the ALS sample collection.

### **TASKS**

1. Operate the “old” (near shore) fish pass continuously until a decision to close the fish pass is made by the project biologist.
2. Count the daily escapement by species, and record the number of net-marked and “jack” (less than 400 mm) sockeye salmon.
3. Sample 80 adult sockeye salmon three times per week for age, length, and sex and document which fish have had their adipose fin clipped.

### **FISH PASS PROCEDURES**

Operate the shoreward (“old”) fish pass from approximately 15 June through 10 August. The starting date should be adjusted to minimize smolt passage through the fish pass. Begin operating the fish pass the day after sockeye salmon are first counted through Dog Salmon weir. The far “new fish pass” will be used for smolt bypass experiments and not for adult passage. Diversion weirs above and below the Frazer falls should be inspected daily for holes and cleaned when required. Specific instructions for fish pass maintenance and operations are provided in Appendix B. These steps prevent fish from escaping through the lower diversion weir, which has

been a major problem in the past. All weir panels on the lower diversion weir should be tightly connected at the base. Panels fit in a channel formed by two pieces of angle iron. This “groove” needs to be cleaned out prior to installing the lower weir. There are “spyglasses” available to check the alignment of panels in the groove. Special attention should be paid to the alignment of the weir panels under water because fish that escape through the lower diversion weir become trapped at the base of the falls.

Count escapement at least four times daily. Increase the frequency during the peak of the escapement to minimize emigration delay. Record the individual counts by species using hand-held tally counters. Count jack salmon (< 400mm) and severely injured fish separately to assess the escapement quality. Data should be recorded on the *Weekly Escapement Enumeration Form* (Figure 7). The sampling week for escapement counting extends from Monday to Sunday.

## **ESCAPEMENT SAMPLING**

Adult sockeye salmon sampling will occur at the top of the fish pass throughout the adult escapement. Details and procedures for adult sampling are outlined in the Kodiak Management Area sockeye salmon catch and escapement sampling operational plan, 2007 (Foster 2007).

## **OTHER REQUIREMENTS**

### **SAFETY**

Safety is the highest priority of this project. State safety regulations and Standard Operating Procedures (SOPs) must be followed at all times. On-site personnel will exercise extreme caution when considering safety issues. Employees not following state safety regulations may be subject to disciplinary action, including termination.

Employees are expected to review, understand and sign the following SOPs before field deployment:

- 111-700 Safety Policies and Standards;
- 111-710 Office/Warehouse Safety;
- 111-720 Field Camp Safety;
- 111-730 Aircraft Safety for Passengers;
- 111-740 Boating Safety;
- 111-750 Vehicle Safety;
- 111-760 Laboratory Safety;
- 111-780 Firearm/Bear Safety.

**In addition, all employees are required to hold a current American Red Cross First Aid/CPR certification. First Aid/CPR classes will be held in Kodiak prior to the field deployment.**

An approved personal flotation device will be worn at all times while boating. A survival kit including matches, VHF radio, flare gun, GPS unit, spare motor parts, and a first aid kit will also be in the boat at all times.

**Ultimately, each employee is responsible for his/her own safety.**

## **TRAINING**

In addition to mandatory CPR and First Aid training, all field personnel will receive training on Salmon Sampling Protocols and be trained in proper use of firearms before departing from town or upon arrival at the field camp.

## **RADIO SCHEDULE**

The Commercial Fishery Division morning radio schedule is from 0800-0845 hours daily and camp personnel will need to be prepared with weir escapement counts for radio schedule on the Single Side Band (SSB) radio. During the smolt season, Kodiak Research office personnel will contact field camps by Satellite phone on the dispatch service at 1300-1315 (1:00-1:15 PM) hours Monday through Friday and at 1900 (7:00 PM) hours on Saturday and Sunday. If contact is necessary at other times, information can be relayed via the Commercial Fishery Management Section schedule at 0800 and 2000 hours. The emergency Coast Guard frequency is 4.125 kHz.

Instructions on the operation and transmission of the satellite phone is provided in Appendix C. The crew leader will train all crew members in proper use of the satellite phone and SSB radio. In order for crewmembers to become more familiar with operating the radio and phone, the crew leader should have the crew member share the radio schedule communications.

## **AIR CHARTERS**

All air charters will be set up through the Kodiak staff. Logistical information will be communicated through daily radio contact. It is important to notify office personnel when any data, equipment, or other freight is "back hauled" to Kodiak and clearly label these items: ADF&G Attn: Rob Baer 486-1835.

## **REPORTING**

Crew leaders will be responsible for recording all of the job activities and compiling biological data. Data forms and a field log will be completed daily. "Rite in the Rain" logbooks will be used while collecting data. Data will be transferred to the proper data forms after returning to the cabin. Use a number 2 pencil when filling in the AWL forms. Data will be reported to Kodiak staff via satellite phone. Completed data forms will be sent to Kodiak as flights permit. Data that is sent to Kodiak will be properly packaged and labeled. Data forms (not AWL forms) must be able to be duplicated in case originals are misplaced in transit.

A brief report of project activities will be sent to town bi-weekly, or on the next available plane (Appendix D).

## **PHOTO DOCUMENTATION**

Crew leaders will be responsible for photo documenting project activities. Specific aspects such as trap installations, weir construction, and other detailed tasks are important to photograph. When possible, ADF&G digital cameras will be used. However, if State cameras are not available, personal cameras may be used.

## **TIMESHEETS**

Forward timesheets to the KODIAK OFFICE by the 15th and last day of each month! Field crew must plan ahead to ensure that timesheets are received on time. To ensure that timesheets are properly filled out, instructions are contained in Appendix E1 and an example of a properly filled

out timesheet is provided (Appendix E2). Plan work activities to be completed in a 7.5-hour day; work overtime only if pre-authorized by the project biologist.

Crew leaders should take the time to look over each crewmember's timesheet before sending them to town to ensure that they are properly filled out.

## **PURCHASING**

During the field season, field crews will need additional items (e.g., groceries, fuel, or tools). Small lists can be read over the satellite phone; however, these lists should be limited to just a few items. Blank grocery lists will be sent to the field and the crew leader should remember to send orders in advance to ensure the correct grocery order for the next supply flight. It should also be remembered that the budget allocates \$20/day/person and this allocation will not be exceeded. Crew leaders should track grocery expenses and limit the number of requested specialty items. Plan ahead when requesting fuel for heating the camp. When the cabin is unoccupied the heater must be turned off.

## **VISITORS / PUBLIC INTERACTION**

Many people visit Frazer Lake; from day-use fishing and bear viewing to extended use through the refuge cabins or campers. Most of these visitors come by the cabin site because the falls attract bears and provide excellent bear viewing opportunities. Visitors are also interested in seeing the fish exiting the fish pass. Due to this frequent contact, the camp must be kept clean and presentable and the field staff will act in a professional and courteous manner that is helpful to visitors. At the same time visitors must be informed of boundaries, limitation and hazards. Be helpful when you can, but remember your primary role is to run the smolt and adult sockeye salmon research project.

## **CAMP INVENTORY AND CLOSE UP**

The Frazer Lake project equipment will be inventoried prior to camp close up. A list of the equipment needed for the next field season should also be provided. The project biologist will provide directions for properly securing the cabin and out buildings prior to the field crew leaving the camp site.

## **REFERENCE CITED**

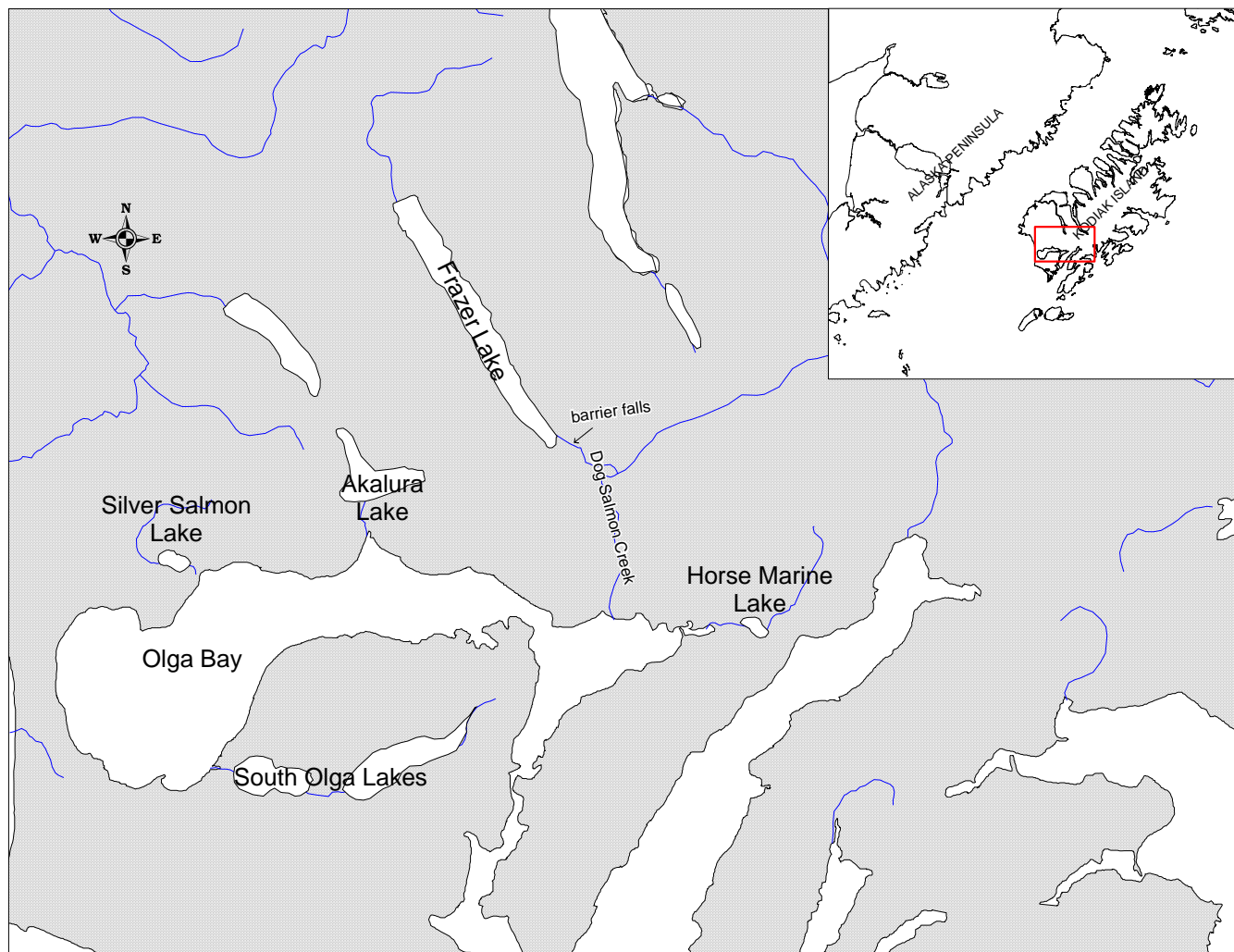
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## **FIGURES**





**Figure 1.**-Location of Frazer Lake on Kodiak Island, Dog Salmon Creek and the Barrier Falls.

## SOCKEYE SALMON SMOLT SUMMARY FORM

PROJECT: FRAZER RIVER

YEAR: 2007

page\_\_\_\_\_of \_\_\_\_\_

[illegible]

<sup>1</sup> Date fishing occurred (trap or seine).

<sup>2</sup> Time (military) in which fishing activity occurred, i.e. 2100 - 2200 hr.

<sup>3</sup> Total number of fish captured (live and dead) during seine or trap fishing time.

<sup>4</sup> Total number of dead fish caught during the fishing time.

**Figure 2.-Daily smolt catch reporting form.**

## DAILY PHYSICAL OBSERVATIONS

PROJECT: **Frazer**

YEAR: 2007

page\_\_\_\_\_of\_\_\_\_\_

[illegible]<sup>1</sup> Weir Site = W; Smolt Site = S

**Figure 3.-**Weather observation form.

ALASKA DEPARTMENT OF FISH AND GAME  
KODIAK MANAGEMENT AREA  
WEEKLY SALMON WEIR COUNT REPORT FOR YEAR: **2007**

WEIR CAMP  
NAME: FRAZER

PERSONNEL: \_\_\_\_\_

PAGE: \_\_\_\_\_ OF \_\_\_\_\_

WEEKLY REPORT  
FOR WEEK ENDING (SATURDAY)

DATE	DAILY TOTAL ESCAPEMENT							STEELHEAD DOWN	REDS SAMPLED	JACK NO.	JACK %	NET MARKED	INJURED REDS	WATER LEVEL (cm)	H <sub>2</sub> O TEMP	WEATHER		
	REDS	L. REDS	KINGS	PINKS	COHOS	CHUMS	DOLLY V.									CEIL.	VIS.	WIND DIR/SPD.
SUN	D																	
	C																	
MON	D																	
	C																	
TUE	D																	
	C																	
WED	D																	
	C																	
THU	D																	
	C																	
FRI	D																	
	C																	
SAT	D																	
	C																	
WEEK TOTAL														COMMENTS:				
														COMMENTS:				
AWL WEEK														COMMENTS:				
AWL CUMM														COMMENTS:				

ADDITIONAL COMMENTS: BEAR AND PEOPLE PROBLEMS; SMOLT MIGRATION; WEIR PROBLEMS; CABIN REPAIR; NOTE AIRCRAFT TRAFFIC

**Figure 4.-**Weekly escapement enumeration form.



## **APPENDIX A. SMOLT AGE-WEIGHT-LENGTH (AWL) SAMPLING MATERIALS AND METHODS**

## **Appendix A1.-Smolt age-weight-length (AWL) sampling materials and methods.**

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Annually, outmigrating salmon smolt are sampled for age (scales), weight, and length, by field crews throughout the Westward Region. These data are essential for sound management of the State's salmon resources.

To be useful, data must be recorded neatly and accurately on the age, weight, length (AWL) optical scanning (opscan) forms. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling juvenile salmon for age, weight, and length.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Be sure to transfer the litho code, located in the left margin on the front side of the AWL form to the back side of the form by darkening the appropriate circles (see Appendix A3.).

Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning. The AWL forms should be treated carefully; the scanner in the Kodiak office cannot read damaged forms. The forms should not be stapled, bent, paper-clipped or folded. Specific instructions for completing AWL forms are listed in Appendix A2 and an example of an AWL form filled out for smolt sampled can be found in Appendix A3.

All juvenile salmon AWL data will be recorded in a field notebook dedicated to smolt sampling. These data will then be transferred from the field notebook to the AWL forms. Each species will have its own AWL sample number series that runs sequentially throughout the season. Up to 40 individual fish per smolt day may be included in one AWL sample. If more than 40 fish are sampled in a single smolt day, then multiple AWL numbers will be used on that day. For example, if 70 sockeye salmon smolt are sampled in a single day (day 1), the AWL numbers will be AWL #001 (fish 1-40; 8 slides) and AWL #002 (fish 1-30; 6 slides). The next day will start with AWL #003. Each day's sample will start with a new AWL number. AWL forms will be numbered sequentially.

Smolt will be sampled as soon as possible after they are captured. The smolt will be transported in clean, 5-gallon buckets to the sampling area. An additional bucket of water will be used as a recovery bucket. Buckets containing smolt will be filled with fresh, clean river water and aerated. The buckets will be covered when possible to avoid stress on the fish.

Tricane Methanesulfate (MS-222) will be used to anesthetize the smolt; latex gloves will be worn to prevent direct exposure to the anesthetic. The chemical will be administered by experienced personnel. A small amount (approximately 1 g) of MS-222 and a small amount of baking soda will be dissolved in approximately 2 L of cold water. The amount of anesthetic used will vary depending on the water temperature, freshness of the chemical, and size of the smolt. A few smolt will be placed in the anesthetic solution until subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. The concentration of the solution should be such that it immobilizes the fish in 2-3 minutes. After the fish are anesthetized, it is important to sample them quickly and place them in a recovery container to prevent mortality. No more than 40 smolt will be anesthetized with one batch of solution.

After the smolt have been immobilized, excess water will be gently removed from the fish using a paper towel or a wet sponge as a blotter. Place the fish on its right side to sample the left side. Measure smolt length, to the nearest mm, from tip-of-snout to tail fork (Appendix A4). Record length by blackening the appropriate column circles on the front side of the AWL form. When collecting length data, take care to ensure that each length corresponds to the appropriate scale smear mounted on the slide, as length-at-age is evaluated for each sample. Weigh each smolt to the nearest 0.1 g, and record the weight by blackening the appropriate column circles on the back side of the AWL form.

On salmon species, the preferred scale is located where a straight line between the posterior insertion of the dorsal fin and the anterior insertion of the anal fin crosses the second scale row dorsal to the lateral line. In smolt, the area directly around this scale is considered the preferred area (Appendix A4). If scales are not present in this area then scales should be taken from the secondary location, which is the same area on the right side of the fish. A scalpel will be used to remove 5-10 scales from the preferred area. These scales will be mounted on a glass slide using a probe to position the scales. Scales from five fish will be mounted on each slide. The scalpel will be wiped clean of scales and slime between each fish. A diagram of a slide with scales mounted correctly is located in Appendix A5.

The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers. A diagram of a properly labeled slide is located in Appendix A5. After sampling, fish will be held in a recovery container until they are swimming normally and then released downstream of the trapping location. When the slides are completed, return them to the box in order by AWL # and fish #. Label the slide box on top with the information listed in Appendix A5.



## **Appendix A2.-Procedure for recording salmon smolt age-weight-length data on AWL forms.**

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Smolt length and weight will be recorded on AWL forms (Appendix X4.). Using a No.2 pencil, complete each section of the left side of the AWL and darken the corresponding blocks.

Fill out each of the following:

### **Description**

Record the following: species, location, year and samplers names (e.g., sockeye smolt, Frazer fish pass, 2003, Sagalkin, Schrof).

### **Card**

The AWL forms and corresponding slides are numbered sequentially by date throughout the season starting with 001. A new, consecutively numbered AWL form is used each day even if the previous AWL form is not full. There may be a minimum of one fish and a maximum of 40 fish (8 slides) per AWL form.

### **Species**

Refer to the reverse side of the AWL form for the correct one digit code (e.g., sockeye = 2).

### **Day, Month, Year**

Use appropriate digits for the date the fish are sampled.

### **District**

List the district in which the fish were sampled. Consult your area statistical map or project leader for the appropriate district.

### **Subdistrict (Section)**

List the subdistrict in which the fish were sampled. Consult your area statistical map or project leader for the appropriate subdistrict.

### **Stream**

List the stream in which the fish were sampled. Consult your area statistical map or project leader for the appropriate stream number.

### **Location**

Leave blank

### **Period**

List the period (sample week) in which the fish were sampled (Appendix C6.).

### **Project and Gear**

Refer to the reverse side of the AWL form for the correct code. For example, smolt samples collected in a trap would have a project code of 8 and a gear code of 00.

### **Mesh**

Leave blank unless specifically instructed by supervisor to do otherwise.

### **Type of length measurement**

Refer to the reverse side of the AWL form for the correct code (e.g., tip of snout to tail fork = 2). Refer to Appendix C2.

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-continued-

**Number of scales per fish**

Fill in the number of scales (smears) collected per fish. For smolt, one scale smear per fish is collected.

**# of cards**

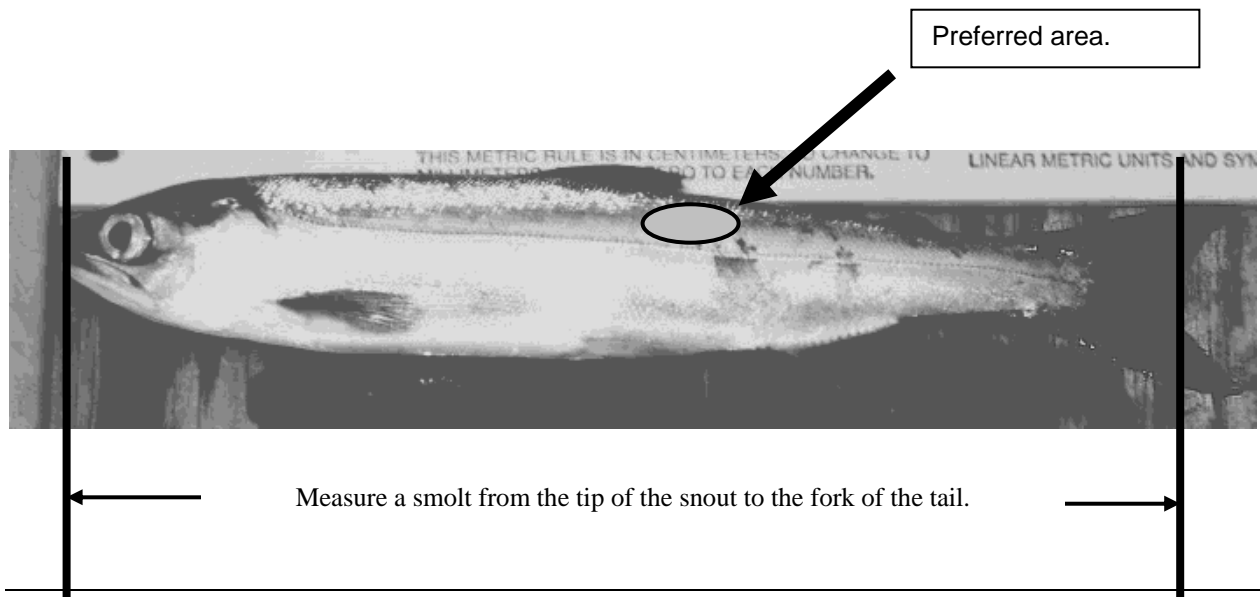
# of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL forms in numerical order throughout the season and keep all forms flat, dry, and clean. Remember, when sampling smolt, weight data is recorded on the back side of the AWL form and the litho code, located in the left margin on the front side of the AWL form must be transferred to the back side of the form (see Appendix A3). The litho code is the number unique to each AWL form and copying the litho code from the front to the back of the form indicates weight data was transcribed on the back of the form for the Optical scanning machine to read. Fish slime and water curling may cause data to be misinterpreted by the optical scanning machine. **It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.**

[illegible]

**Appendix A4.**-Photo of a smolt with the preferred area highlighted.

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**Appendix A5.**-An example of 2 correctly labeled smolt slides. This represents fish 1 through 10 from a sample collected on 5/11/00.

---

AWL 001 Sockeye Bear Lake 5/11/00 Fish 1 - 5	1				5
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•

AWL 001 Sockeye Bear Lake 5/11/00 Fish 6-10	6				10
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•
	•	•	•	•	•

When the slides are completed, return them to the box in order by AWL # and fish #, and label the slide box on top with the following information:

Location: Bear Lake

AWL Number: AWL 001-003

Beginning and end dates: 6/12-7/13/00

Sockeye Salmon Smolt

---

**Appendix A6.-Sampling weeks and associated calendar dates.**

Week	Calendar Dates	Week	Calendar Dates
1	01-Jan to 07-Jan	28	09-Jul to 15-Jul
2	08-Jan to 14-Jan	29	16-Jul to 22-Jul
3	15-Jan to 21-Jan	30	23-Jul to 29-Jul
4	22-Jan to 28-Jan	31	30-Jul to 05-Aug
5	29-Jan to 04-Feb	32	06-Aug to 12-Aug
6	05-Feb to 11-Feb	33	13-Aug to 19-Aug
7	12-Feb to 18-Feb	34	20-Aug to 26-Aug
8	19-Feb to 25-Feb	35	27-Aug to 02-Sep
9	26-Feb to 04-Mar	36	03-Sep to 09-Sep
10	05-Mar to 11-Mar	37	10-Sep to 16-Sep
11	12-Mar to 18-Mar	38	17-Sep to 23-Sep
12	19-Mar to 25-Mar	39	24-Sep to 30-Sep
13	26-Mar to 01-Apr	40	01-Oct to 07-Oct
14	02-Apr to 08-Apr	41	08-Oct to 14-Oct
15	09-Apr to 15-Apr	42	15-Oct to 21-Oct
16	16-Apr to 22-Apr	43	22-Oct to 28-Oct
17	23-Apr to 29-Apr	44	29-Oct to 04-Nov
18	30-Apr to 06-May	45	05-Nov to 11-Nov
19	07-May to 13-May	46	12-Nov to 18-Nov
20	14-May to 20-May	47	19-Nov to 25-Nov
21	21-May to 27-May	48	26-Nov to 02-Dec
22	28-May to 03-Jun	49	03-Dec to 09-Dec
23	04-Jun to 10-Jun	50	10-Dec to 16-Dec
24	11-Jun to 17-Jun	51	17-Dec to 23-Dec
25	18-Jun to 24-Jun	52	24-Dec to 30-Dec
26	25-Jun to 01-Jul	53	31-Dec
27	02-Jul to 08-Jul		



## **APPENDIX B. FISH PASS MAINTENANCE AND OPERATION**



## Appendix B1.-Fish pass maintenance and operation.

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**Initial maintenance of the fish pass should be completed prior to 1 June to ensure proper functioning of the facility.**

**Maintenance consists of the following:**

1. Inspect the fish passes for structural damage.
2. Install the modified I-beam supports on the diversion weir above the falls.
3. Clean the debris from the fish pass tanks.
4. Clean the fish pass entrance if necessary. The shiny surface may make some fish shy away from the entrance, if this occurs, add rocks to cover the aluminum.
5. Clear rocks and streambed materials from the entrance of the exit tank, channel, stop-log base of water control weir, and entrance tanks.

**Fish pass opening procedures include:**

1. Insert wood drain plugs from the inside of the tanks into drain holes. Plugs should fit tightly, so that internal tank water pressure holds the plug in place. Install the tank caps by screwing them on from the outside.
2. Position tank covers, and remove stop-logs slowly from exit tank. The **bottom stop-log remains in place**. Note that if stop-logs are removed rapidly gravel is deposited into tank.
3. Make sure no holes are present where fish could escape uncounted.

The fish pass should be operated so that the steep pass is about 3/4 full of water. This volume is necessary to attract sockeye salmon to the entrance tank and promote optimum fish passage. A water level of 1.8-1.9 feet should be maintained on the staff gauge by removing or placing stop-logs at the far end of the water control diversion (top of falls). At this level the old fish pass should be 3/4 full. Try to keep stop logs relatively even level across the weir to prevent excessive erosion.

A vertical slot "door" should be placed at the entrance tank during the sockeye salmon run. This door should be checked daily during fish passage to assure it is completely down. It can open, inadvertently, when sockeye salmon hit against it. The opening space (23 cm) is needed to maintain velocity for fish attraction. The door can be opened to 1 foot (30 cm) at seasons end to further attract fish.

The fish pass should be checked daily for cover tightness and unobstructed water flow. Under no circumstances should obstructive materials be placed in the exit tank or steep passes. Make sure to remove any dead fish observed in the exit tank as soon as possible because dead fish will accumulate in the resting tanks making the end of season task of cleaning extremely unpleasant.

Do not let detergents or chemicals enter the fish pass water supply.

Post and maintain a "Keep off the fish pass" sign on the trail between the cabin and the fish pass and put up other signs directing visitor traffic to appropriate trails.

---

**Fish pass closing procedures (approximately 10 August):**

1. Remove stop-logs and I-beam supports from the water control weir. Stack logs on the stream bank and store the I-beams (well greased) in the tractor shed. Replace stop-logs in the exit tank, and visqueen as necessary to stop water flow between logs.
  2. Remove all the drain caps by lightly tapping them from outside of the tanks, and store the plugs in the tractor shed. All water should be drained from the tanks. All residual materials within the tanks should be removed.
  3. Remove the vertical slot door and replace it with a solid door to prevent unwanted animals from entering.
  4. Inspect the fish pass and the facility for needed repairs, and list needed materials in the daily log/annual report. **Also include fuel caches and propane so that we know what is left behind.**
  4. When the lower weir is removed, panels should be stored on the lower stream banks. Bolts on the weir should be tightened and replaced if necessary. Catwalk and stringer materials should be inspected and replaced if required. Add lumber needs to the materials list.
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## **APPENDIX C. SATELLITE TELEPHONE AND DISPATCH INSTRUCTIONS**

## **Appendix C1.-Satellite telephone and dispatch instructions.**

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The following information serves as a Policy Statement regarding the allowable uses of ADF&G satellite phones and Instructions on the proper method to successfully set up and operate the satellite phone system assigned to your camp.

These systems are not like standard telephones or cell phones, nor are they like a single side band or VHF radio. Communication is sent through the transmitter to low level satellites, then is beamed down to ground stations, either directly to another satellite phone system or to a switching station linked to standard telephone lines. As such, there is a much higher cost involved in operation than with standard telephone long distance or cell phone charges.

**Under NO CIRCUMSTANCES may you use this satellite phone system for personal calls,** unless, for each event, you have obtained direct and explicit permission from your supervisor. This does not mean that field crew leaders may grant permission for personal use of this phone. Only the project biologist may give you such permission. **ANY DELIBERATE MISUSE OF THIS SYSTEM, SUCH AS MAKING UNAPPROVED, NON-EMERGENCY, OR PERSONAL CALLS, WILL RESULT IN DISCIPLINARY ACTION, WHICH MAY INCLUDE SUSPENSION OR DISCHARGE.**

The primary purpose for having this satellite phone is for secure, reliable communications between remote field stations and ADF&G offices (Kodiak, Chignik, Cold Bay, Sand Point, or Port Moller), ADF&G research vessels (Resolution or K-Hi-C), Fish and Wildlife Protection vessels and offices, or other field camps that are similarly equipped. The secondary purpose is for your SAFETY. With these phones you are capable of directly dialing emergency services at any time of the day or night. It is essential that these phone systems are maintained in good working order, are fully charged or hooked to sufficient power at all times, and remain free for official or emergency use.

### **INSTRUCTIONS**

The portable sat phone unit must be charged with power. There is an internal battery pack, and a 12-volt adapter is available in order to hook the phone to a larger battery bank, that may in turn be recharged by generator or solar panels.

Turn the unit on using the power switch in the lower left corner. A green light, just above the switch, should come on indicating that the unit is sufficiently powered. If no light or a red light comes on, you will need to charge the unit, or attach it to your 12-volt battery bank via the appropriate connections.

The back, or top, of the briefcase-like unit is the antenna, and it must be oriented correctly in order to access the receiving satellite. The top of the case should be open and pointed in a general east-southeast direction. You must have a fairly clear line-of sight to the horizon in that direction; this unit will NOT work through walls or mountains. The angle of the antenna should be almost vertical; remember to lock the support arm that attaches the lid to the main body of the unit, along the right side.

This system has two means for calling; a telephone-like handset (for dial in or dial out phone calls), and a push-to-talk microphone (for 'dispatch', unit to unit, calls). All calls made with the handset are billed per minute of use, at an expensive rate. All calls on the 'AlaskaNet' dispatch system, using the microphone, are essentially FREE.

When first turned on, the handset and microphone should become active, with the display panels on the top of the phone handset and microphone lighting up (one LED panel, hopefully the one on the handset, should read SLEEP). The display will show, after a few moments, whether a connection has been established with the satellite, and how strong the signal is (ex. *B05 S 21*). Turn the unit slightly, and raise or lower the lid/antenna slightly until the highest possible signal strength is indicated (normally above 20 but will work down to 8). Lock the lid/antenna in place and do not turn the unit again, until your communications are finished. Once a strong signal is acquired push the “\*” button for 2 seconds. Wait until there is a “beep” and the LCD screen displays ‘00:DN ??’, then dial the number.

### **Alaska Dispatch System**

Because all calls made on the dispatch system are FREE, this is the method of choice for using the satellite phone units. There are several ADF&G offices, many field camps, and two research vessels on the AlaskaNet dispatch system, as well as Fish and Wildlife Protection/State Troopers offices and vessels, plus many canneries, fishing vessels, and tenders. You should have received a 10-12 page directory with your phone.

First, make sure the unit is turned on, and that there is sufficient power. Set the unit up so that the signal strength is at the maximum for your location. You should see the signal strength on the microphone display (ex. *B05 S 21*), and the handset display should read SLEEP. Once a strong signal is acquired push the “\*” button for 2 seconds. Wait until there is a “beep”.

On the microphone display, below the signal strength, there should be a query, ‘00:DN ??’. This is asking you to ‘dial’ in the 4-digit dispatch number that you wish to call. After you have entered the 4-digit dispatch number of the unit you wish to contact, hold in the microphone key and a connection will be made with the satellite, which will then try to connect with the dispatch number you punched in. IF a connection is made you will hear two beeps (“bird chirps”) and the microphone display will read SELF. While continuing to hold in the microphone key, call the station you wish to talk to. USE ALL THE SAME FORMALITIES AS WHEN CALLING ON A SSB RADIO. For example, say “Calling the ADF&G Kodiak Office, Calling the ADF&G Kodiak Office; this is Karluk Weir”. When you release the microphone key, the unit will beep again.

BE PATIENT. It will take some time for the signal to go up to the satellite, down to the number you called. It may take the other party some time to get to the microphone and respond (this is especially true for calls to the ADF&G office; supervisors have to walk down to the radio room to respond). When they respond, their 4-digit dispatch number (DN) will show on the microphone display. This is a private conversation, unlike the previous dispatch service.

Just remember to be patient; wait until the other party stops speaking and you hear the unit beep (indicating that they are finished with this portion of their communication), the display should read SELF, and you may key microphone to talk. Then you must again wait for the other party to respond. If the other party is not there, they simply will not answer. If the satellite connection cannot be made, the display will read ‘Unable to Connect’ or ‘Not Available’.

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## **Phone System**

DO NOT USE THE HANDSET TO PLACE CALLS UNLESS ABSOLUTELY NECESSARY. All calls made with the handset are billed per minute of use, at an expensive rate. Calls should only be made to supervisors, either when radio or dispatch contact is not possible or when a confidential message needs to be relayed. Calls are made by dialing out, almost like a standard telephone. Punch in the area code and telephone number, then PRESS SEND (button located in the upper right corner of the handset). Because there is a satellite relay, there will be a slight delay between when you speak and when the other party hears you, so be patient.

Note EVERY call in a phone logbook. The system will show you the amount of time you've used on the call, on the LED panel. Note the number called, the date, approximate time, and the length of the call (minutes and seconds). When the call is completed, you MUST push the END button (top right corner of handset buttons), otherwise the system will remain active and YOU will be billed for the time (at almost a dollar a minute). Remember, PRESS END.

If someone calls in to this unit, it will ring, like a standard telephone. Press the SEND button to start the conversation, but remember to PRESS END to finish the call. ADF&G is billed for all calls made using the handset, both the calls you dial out and any calls dialed in.

## **Assistance**

If the phone or dispatch system are not operating properly and you are not able to trouble shoot the issue there is a help line that can be called by dialing **611** on the phone system which will take you to technical support.

## **IN CASE OF EMERGENCY:**

If there is a medical emergency, or a real danger to life or health, IMMEDIATELY call the US Coast Guard Rescue Coordination Center at 800-478-5555. Be ready to tell them your name, exact location (latitude and longitude or nearby major landmark), and the exact nature of your emergency. They may question you extensively, so be prepared. There are emergency doctors on-call that can advise you. After the call is completed, immediately call your supervisor, at work or at home, and relay the details of your experience.

If there is an enforcement emergency, use the dispatch microphone to call the Kodiak office or the Alaska State Trooper, Fish and Wildlife Protection (DN 6370).

## **APPENDIX D. WEEKLY REPORT EXAMPLE**



## **Appendix D1.-An example of a weekly report.**

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To: Rob Baer  
Alaska Department of Fish and Game  
Fishery Research Biologist  
Kodiak, Alaska

Date: May 20, 2006

From: Jason Fox  
Alaska Department of Fish and Game  
Fish and Wildlife Technician III  
Litnik Field Camp

Subject: Activity Report for May 14-20, 2006

### **Smolt Counts & Sampling**

The smolt trap here has been fishing since May 10<sup>th</sup>, but we saw our first smolt on May 16<sup>th</sup>. Our cumulative catch thru this week is 83. The run seems to have started later this year due to lake freezing and winter-like conditions in the Kodiak/Afognak area until early May. We also sampled 20 smolt on May 19<sup>th</sup> as an introductory example for new crewmate Josephine Deguzman. The smolt we sampled had an average length of 81.2mm and an average weight of 4.0g.

### **Dye Test and Trap Efficiency**

We have not yet had enough fish to do a dye release test. As far as putting in the smolt trap is concerned, we were not originally able to get the incline into "optimal" position due to high water conditions at the time of installation. As we found out last year, this may be a problem when *low* water conditions occur, as the catch box may not be able to be lowered any further than a potential high spot that it is currently over. This will be addressed as the season goes on.

### **Adult Weir Counts**

The adult sockeye weir was installed and fish tight at 7pm on the evening of May 19<sup>th</sup>. Surveys of the lagoon and lower river below the weir revealed no signs of returning adults yet. We have not counted any adults upstream as of yet.

### **Miscellaneous**

River otters have been a very significant nuisance so far this season. We have installed a protective cage around the area between the cod end of the incline where fish drop into the catch box. Last year, this seemed effective. However, the chicken wire tends to gather a significant amount of river debris in high water conditions. This debris buildup also tends to cause an increase in smolt mortality because the smolt have to get through the debris to the catch box.

### **Anticipated Activities**

Crew will have to maintain a clean trap to reduce mortality in smolt. We also are going to monitor adult steelhead out-migration this spring to experiment with effective ways to pass them downstream. We also need to fill sand bags to add to weir and smolt trap to make them more secure and fish tight.

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## **APPENDIX E. TIMESHEET INSTRUCTIONS**

## **Appendix E1.-Instructions for filling out a timesheet.**

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All ADF&G employees must fill out a time sheet biweekly and these timesheets must be turned in to the Administrative staff in Kodiak in a timely manner. Please follow these instructions when filling out your time sheets to avoid payroll problems. When a flight comes out to drop off groceries, or for any other reason, near the end of a pay period, camp personnel need to send in their timesheets. Fill in the time sheet up to the day you send them in and attempt to project your remaining hours worked.

Fill out each of the following on the top of the timesheet:

**Pay period:** pay periods start on the 1<sup>st</sup> or 16<sup>th</sup> of each month and end on the 15<sup>th</sup> or end of the month (example: June 1-15 or June 16-30).

**SSN:** your social security number

**Name:** full name

**Division:** Commercial Fish

In the actual timesheet table fill in the following:

**Day:** Monday, Tuesday, etc.

**Date:** 6/16, 6/17, etc.

**Hours worked box:** start and stop time in military time

**Code 1:** fill in the number of hours worked for that day (see example in Appendix X.2.).

**Work hours and Code 1 Totals** should both equal the sum of daily hours worked. If your time sheet is sent in before the end of the pay period, project your time for the remaining days so you can total your columns.

**Charge to Table** located on the bottom left hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

**Comments Table** located on the bottom right hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

**Employee's signature and date:** Be sure to sign and date your timesheet.

**Crew leaders are responsible for reviewing each crew member's timesheet before sending them to town to ensure that they are properly filled out.**

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# **Afognak Lake Sockeye Salmon Smolt Project Operational Plan**

by

**Robert T. Baer**

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April 2007

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Alaska Department of Fish and Game

Division of Commercial Fisheries



## Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mid-eye-to-fork	MEF
gram	g	all commonly accepted		mid-eye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	<b>Mathematics, statistics</b>	
meter	m			<i>all standard mathematical</i>	
milliliter	mL	at	@	<i>signs, symbols and</i>	
millimeter	mm	compass directions:		<i>abbreviations</i>	
		east	E	alternate hypothesis	H <sub>A</sub>
		north	N	base of natural logarithm	<i>e</i>
		south	S	catch per unit effort	CPUE
		west	W	coefficient of variation	CV
		copyright	©	common test statistics	(F, t, $\chi^2$ , etc.)
		corporate suffixes:		confidence interval	CI
		Company	Co.	correlation coefficient	
		Corporation	Corp.	(multiple)	R
		Incorporated	Inc.	correlation coefficient	
		Limited	Ltd.	(simple)	r
		District of Columbia	D.C.	covariance	cov
		et alii (and others)	et al.	degree (angular)	°
		et cetera (and so forth)	etc.	degrees of freedom	df
		exempli gratia		expected value	<i>E</i>
		(for example)	e.g.	greater than	>
		Federal Information		greater than or equal to	≥
		Code	FIC	harvest per unit effort	HPUE
		id est (that is)	i.e.	less than	<
		latitude or longitude	lat. or long.	less than or equal to	≤
		monetary symbols		logarithm (natural)	ln
		(U.S.)	\$, ¢	logarithm (base 10)	log
		months (tables and		logarithm (specify base)	log <sub>2</sub> , etc.
		figures): first three		minute (angular)	'
		letters	Jan,...,Dec	not significant	NS
		registered trademark	®	null hypothesis	H <sub>0</sub>
		trademark	™	percent	%
		United States		probability	P
		(adjective)	U.S.	probability of a type I error	
		United States of		(rejection of the null	
		America (noun)	USA	hypothesis when true)	$\alpha$
		U.S.C.	United States	probability of a type II error	
			Code	(acceptance of the null	
		U.S. state	use two-letter	hypothesis when false)	$\beta$
			abbreviations	second (angular)	"
			(e.g., AK, WA)	standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var
<b>Weights and measures (English)</b>					
cubic feet per second	ft <sup>3</sup> /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
nautical mile	nmi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
<b>Time and temperature</b>					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
degrees kelvin	K				
hour	h				
minute	min				
second	s				
<b>Physics and chemistry</b>					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt,				
	‰				
volts	V				
watts	W				

# **AFOGNAK LAKE SOCKEYE SALMON SMOLT PROJECT OPERATIONAL PLAN**

by

Robert T. Baer

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April 2007

The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric, and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: <http://www.sf.adfg.ak.us/statewide/divreports/html/intersearch.cfm>.

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# TABLE OF CONTENTS

	Page
LIST OF FIGURES .....	ii
LIST OF APPENDICES .....	ii
ABSTRACT .....	1
INTRODUCTION .....	1
Goal .....	2
Objectives .....	2
Tasks .....	2
SUPERVISION .....	3
PROCEDURES .....	3
Smolt Trap Installation, Monitoring, and Maintenance .....	3
Smolt Trap Catch and Species Enumeration .....	3
Smolt Trap Efficiency and Mark-Recapture .....	4
Delayed Mortality Experiment .....	5
Smolt Age, Weight, and Length Sampling .....	5
Physical Data .....	6
OTHER REQUIREMENTS .....	6
Safety .....	6
Training .....	7
Radio Schedule .....	7
Air Charters .....	7
Reporting .....	7
Camp Inventory and Close Up .....	8
Photo Documentation .....	8
Timesheets .....	8
Purchasing .....	8
REFERENCE CITED .....	8
FIGURES .....	11
APPENDIX A. SMOLT AGE-WEIGHT-LENGTH SAMPLING .....	17
APPENDIX B. SATELLITE TELEPHONE AND DISPATCH INSTRUCTIONS .....	27
APPENDIX C. WEEKLY REPORT EXAMPLE .....	31
APPENDIX D. TIMESHEET INSTRUCTIONS .....	35

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1. Location of the ADF&G camp along the Afognak River and Afognak Lake on Afognak Island.....	12
2. Daily smolt trap catch reporting form. ....	13
3. Sockeye salmon smolt summary form. ....	14
4. Smolt dye release form.....	15
5. Daily physical observation form. ....	16

## LIST OF APPENDICES

<b>Appendix</b>	<b>Page</b>
A1. Smolt age-weight-length (AWL) sampling materials and methods. ....	18
A2. Sampling weeks and associated calendar dates. ....	20
A3. Photo of a smolt with the preferred area highlighted. ....	21
A4. An example of 2 correctly labeled smolt slides representing fish 1 through 10 from a sample collected on 5/11/00. ....	22
A5. Procedure for recording salmon smolt age-weight-length data on AWL forms.....	23
A6. Example of an AWL form filled out for smolt sampled (Note: Project code should be 8 not 4). ....	25
B1. Satellite telephone and dispatch instructions.....	28
C1. An example of a weekly report. ....	32
D1. Instructions for filling out a timesheet.....	36
D2. Example of a completed timesheet.....	37

## ABSTRACT

Afognak Lake sockeye salmon *Oncorhynchus nerka* runs declined substantially in 2001 and subsequent escapements from 2002-2004 have been well below the escapement goal. Responding to concerns from local subsistence users, the Alaska Department of Fish and Game began investigations of the lake's rearing environment. With successful completion of a one-year mark-recapture feasibility study to estimate smolt abundance in 2003, a three-year study (2004-2006) to evaluate the smolt abundance estimates and assess rearing and spawning habitats was funded. A proposal to continue the smolt enumeration and biological sampling project was awarded for an additional three years (FY 2007-2009). The continuation of smolt abundance and condition data are import factors when assessing the adult production. This operation plan provides the instruction and procedures to properly conduct the smolt outmigration study of Afognak Lake.

Key words: Kodiak, sockeye salmon, *Oncorhynchus nerka*, smolt, Afognak, Litnik, trap, mark-recapture.

## INTRODUCTION

The Afognak Lake drainage is located on the southeast side of Afognak Island approximately 50 kilometers (km) northwest of the city of Kodiak (Figure 1). Afognak Lake (58° 07' N lat., 152° 55' W long.) lies about 21 m above sea level, is 8.8 km long, up to 0.8 km wide, and has a surface area of 5.3 km<sup>2</sup> (Schrof et al. 2000). Runoff from Afognak Lake flows in an easterly direction via the 3.2 km Afognak River, emptying into Afognak Bay. The Afognak Lake system was the most productive sockeye salmon *Oncorhynchus nerka* system on Afognak Island in the 1990s. Total estimated sockeye salmon runs from the Afognak Lake system averaged 130,630 fish from 1990 through 1999 peaking at 219,126 in 1996 (Honnold and Schrof 2004).

Sockeye salmon escapements during the 1990s ranged from 66,869 (1998) to 132,050 (1997) and averaged 90,464 fish, well above the upper range of the Sustainable Escapement Goal (SEG; Honnold and Schrof 2004). In 2000, the sockeye salmon escapement of 54,064 was below the previous 10-year average but still fell within the SEG range of 40,000 to 60,000. Low escapement levels experienced during the 2001 season resulted in commercial salmon fishing closures in the Afognak area until July and season long sockeye salmon sport fishery restrictions. Despite these restrictions, the total sockeye salmon escapement was 24,271 in 2001, far below the lower end of the SEG (40,000; Nelson and Lloyd 2001). Sockeye salmon escapements into the Afognak River failed to reach the low end of the SEG from 2002-2004. During the same three year time period, the commercial salmon fishery in Afognak Bay was closed and sport fishing for sockeye salmon was also restricted. The Alaska Department of Fish and Game (ADF&G) and Federal Subsistence Board jointly closed much of Afognak Bay to subsistence fishing for sockeye salmon in 2002, 2003, and 2004.

In January 2005, the Alaska Board of Fish changed the Afognak Lake SEG of 40,000-60,000 sockeye salmon to a Biological Escapement Goal (BEG) of 20,000-50,000 (Nelson et al. 2005). The escapement goal was changed from an SEG to a BEG based on more thorough spawner-recruit data and was reduced because recent escapement trends are more reflective of sustainable production because the system is no longer stocked with juvenile sockeye salmon or fertilized. Escapement into Afognak Lake in 2005 was 21,577 sockeye salmon. The commercial fishery was only open in the Afognak area for a single fishing period in 2005 and only 356 sockeye salmon were harvested. For the first time in three years the subsistence fishery did not close but only 696 subsistence fish were harvested. The 2006 run was similar to the 2005 run in which 22,933 sockeye salmon escaped into the system. The commercial fishery was never opened for the target sockeye salmon fishery and only six sockeye salmon were harvested during the pink

salmon fishery. The subsistence fishery markers were moved to the outside portion of the bay with little harvest success.

Prior to 2003, sockeye salmon production had been assessed by adult escapement and harvest estimates; juvenile production (smolt) of the Afognak Lake sockeye salmon stock had not been reliably assessed. In 2003, a sockeye salmon smolt project was initiated at Afognak Lake to estimate the number, age, size, and condition of the smolt emigration. From 2004 through 2006, the smolt project was continued and the rearing environment (limnology) was monitored. An additional three year smolt assessment study will be conducted at Afognak Lake in 2007 and will continue through 2009. These data are essential in determining future Afognak Lake sockeye salmon stock production, as well as the future outlook for subsistence, commercial, and sport harvesters. Additionally, smolt abundance and limnology data will assist in the development of appropriate strategies to improve returns.

## **GOAL**

The project goal is to assess the sockeye salmon production from Afognak Lake and to develop a strategy to restore and/or stabilize the sockeye salmon run.

## **OBJECTIVES**

To achieve the project goal, ADF&G Research personnel will collect data to:

1. Estimate the number of sockeye salmon smolt emigrating from Afognak Lake,
2. Estimate the average age, weight, length, (AWL) and condition of sockeye salmon smolt emigrants from Afognak Lake,
3. Evaluate the water chemistry, nutrients, and zooplankton levels in Afognak Lake, and
4. Summarize project activities and data collection into a report that will be submitted to the Federal Office of Subsistence Management.

## **TASKS**

1. Set up camp. Target completion date: 7-11 May.
2. Install and operate a Canadian fan trap to capture a portion of sockeye salmon smolt emigrants. Target date: 10 May until the end of the smolt emigration.
3. Enumerate the daily smolt trap catch of fish by species.
4. Mark approximately 650 sockeye salmon smolt weekly, using Bismark Brown Y (BBY) dye, to estimate trap efficiency, which is necessary to estimate the total smolt emigration. Of the 650 dyed sockeye salmon smolt, 100 smolt will be held for a delayed mortality experiment.
5. Collect AWL data from 40 sockeye salmon smolt per day, for five consecutive days each week (200 samples/week).
6. Collect physical data daily: air temperature, water temperature, water level, cloud coverage, wind direction and velocity, and precipitation.
7. Collect water and zooplankton samples at station 1 and 2 (zooplankton only) approximately every four weeks from May to September at Afognak Lake (Refer to the Lake Assessment operational plan for the sampling protocol).

## **SUPERVISION**

Project Biologist: Rob Baer- Fishery Biologist II

Field Staff: Jason Fox- Crew leader (Fish and Wildlife Tech. III)

*Assistant-* Crew member (Fish and Wildlife Tech. II)

The project biologist will oversee the project, provide logistical and technical assistance, and write an annual report. The crew leader will implement the ADF&G safety guidelines, schedule daily tasks, and oversee operations at the field camp. The crewmember will assist the crew leader in all assigned tasks and field operations.

## **PROCEDURES**

### **SMOLT TRAP INSTALLATION, MONITORING, AND MAINTENANCE**

A Canadian fan trap will be located approximately 32 m upstream from the stream terminus of Afognak River in Afognak Bay. The trap will be installed so the water velocity is sufficient to force smolt into the catch box while ensuring that smolt are not injured (scale loss, pinned against the perforated sheeting, etc.). Perforated (1/8") aluminum sheeting (4' x 8' perf-plate), supported by a rackmaster supported pipe frame, will be placed at the entrance of the trap in a "V" configuration to increase trap efficiency. If necessary, the perf-plate 'wings' may be lined with plastic sheeting to increase water velocity in the trap and avoid smolt scale loss.

The trap and wings will:

- Be kept free of debris to maintain trap efficiency and minimize smolt mortality.
- Require frequent monitoring and maintenance to ensure that the trap is working properly. The trap should be checked every 3-4 hours during the day and every 1-2 hours at night.
- Migration patterns change with significant weather changes (i.e., rain may trigger a large emigration). The trap will be fished continuously for the duration of the smolt emigration (~10 May until ~30 June).
- If unforeseen conditions occur and smolt trapping must temporarily cease, the trap will be modified or the wings pulled from the water to allow smolt to pass safely. If possible, any modifications to the trapping system will be discussed with the project biologist before implementation. If immediate modifications are necessary to avoid major mortality or loss of equipment, the project biologist will be notified as soon as possible.

### **SMOLT TRAP CATCH AND SPECIES ENUMERATION**

Since smolt primarily migrate at night, a single trapping or sampling day will be the 24-hour period from noon of the first day to noon the following day and will correspond with the first day. All fish caught in the smolt trap will be counted. A dip net will be used to remove and release the fish as they are counted. Smolt needed for sampling will be held in a covered live-box. Smolt will be handled with care, as sockeye salmon smolt are very sensitive to any stress, and mortality can occur through the loss of just a few scales. A tally counter will be used to enumerate the smolt to assure an accurate count. All data, including smolt mortality will be entered on the *DAILY SMOLT TRAP CATCH REPORTING FORM* (Figure 2) each time the trap is checked. Daily trapping data will be summarized on the *SOCKEYE SALMON SMOLT SUMMARY FORM* (Figure 3).

Pollard et al. (1997) provides color pictures and explanations in the *Field Identification of Coastal Juvenile Salmonids* key for species identification. Contact the project biologist if any questions regarding identification occur.

### **SMOLT TRAP EFFICIENCY AND MARK-RECAPTURE**

The trap efficiency estimates are necessary to estimate the total sockeye salmon smolt emigrating from Afognak Lake. Mark-recapture trials will be conducted to determine what percentage of the outmigration the trap is catching. Bismark Brown Y (BBY) dye will be used to mark and identify the smolt used for these trials. The dyeing process can be very stressful to smolt, so every effort should be made to minimize and avoid unnecessary handling of the smolt during the process. Excessive handling (netting), increased water temperatures, and exposure to the dye are the primary stresses. Individually, these can induce mortality. In combination, significant mortality may occur. The following methods will be used for marking and releasing smolt:

- All data will be recorded on the *Smolt Dye Release Form* (Figure 4).
- Once a week, 650 sockeye salmon smolt will be collected for marking. If the emigrating run strength is not sufficient to capture 650 smolt in one night, smolt will be collected and held in a live-box for up to two days to obtain 650 smolt to be dyed. Approximately, 550 smolt will be dyed and released, while 100 dyed smolt will be retained to monitor delayed mortalities of dyed smolt. Smolt sampled for AWL will not be used in the dye test.
- Marking will take place at the release site, located approximately 1,240 m upstream from the trapping site. The smolt will be transported to the mark/release site by four-wheeler and a trailer. A garbage can will be used as a holding container and secured to the trailer. Sufficient water will be added to the can to minimize over-crowding. Water temperatures will be recorded. Supplemental oxygen will be added continuously throughout transport and a lid secured to prevent water from spilling over. Any mortality will be recorded upon arrival at the release site.
- Water temperatures will be taken from both the transport container and the recovery container in the stream. If the temperatures differ by more than 1-2 degrees Celsius, river water will be added to the appropriate container to stabilize the temperature. The smolt will be allowed to rest in a live box in the river for at least 30 minutes after the transport to the marking site. The live box holding the smolt will be covered to minimize stress.
- A solution of 1.9 g of BBY dye to 15 gallons of water will be dissolved in a 30-gallon plastic garbage can. The smolt will be placed in the dye for 30 minutes and the garbage can will be covered and oxygenated continuously (but gently - do not roll them) during the dyeing process.
- Following dyeing, all dyed smolt will be held in the live-box for a minimum of 60 minutes. Smolt displaying “abnormal” behavior will NOT be released. A fish with “abnormal” behavior may be swimming on its side, upside down, puffing or flaring gills continuously.
- Dyed smolt displaying “normal” behavior will be counted (up to 550) and released evenly across the creek with the use of water filled buckets. The process should be timed such that smolt will be released at ~2200 hours or under the cover of darkness. The

remaining 100 smolt that were dyed will be held in a live box up to four days to determine smolt survival from the dye as part of Delayed Mortality Experiment.

- Monitor the smolt trap for marked smolt daily from the day of the release and continue until the next dye test. The number of dyed smolt observed will be recorded on the *Daily Smolt Catch Reporting Form* (Figure 2) and the *Sockeye Salmon Smolt Summary Form* (Figure 3). The number of smolt examined in a day equals the marked and unmarked smolt caught that day. The daily smolt catch will not include marked smolt, since they were previously counted at the trap site. The trap efficiency from this dye test will be a percentage of the dyed fish recovered divided by the dyed smolt released.

## **DELAYED MORTALITY EXPERIMENT**

To test for potential bias in the mark-recapture estimates of the Afognak Lake sockeye salmon smolt emigration, delayed mortality of dyed smolt will be measured for each dye test. During each dye test, 100 additional smolt will be dyed simultaneously with the 550 smolt dyed that are released to test the trap efficiency. Smolt used for the mortality experiment will be handled the same way as the smolt being released, except they will not be released. Smolt dyed for the mortality experiment will be held in a covered instream live box and checked daily for mortality over a 4-day period.

## **SMOLT AGE, WEIGHT, AND LENGTH SAMPLING**

Refer to Appendix A1 for a description of smolt AWL sampling materials and methods. A sample of 40 sockeye salmon smolt per day for five (5) consecutive days per sample week will be collected to obtain AWL data. A sample week begins on Wednesday and runs through the following Tuesday (Appendix A2). All smolt sample data will reflect the sampling day when the fish were captured. Each sample will be comprised of a single day's catch and samples will not be mixed between days. If less than 40 fish are caught in a sampling day, the sample size for that day will be the number of fish caught on that day. Dyed smolt used to estimate trap efficiency will not be sampled.

The daily smolt sample will be taken randomly. Collect smolt hourly and place them in the live box. Use a small dip net to remove a sub-sample of 40 sockeye salmon smolt from the live box to be sampled. All remaining smolt will be counted and released, unless they are being held for a future dye test.

Smolt will be sampled on the day of capture. Smolt will be measured from the tip of the snout to the tail fork to the nearest mm. (Appendix A3). Excess water will be removed from the smolt before weighing by using a paper towel as a blotter. Individual smolt weights will be measured to the nearest 0.1 g. A scalpel will be used to remove 5-10 scales from the preferred area of the fish (Appendix A3). The scales will be mounted on a glass slide as shown in Appendix A4. Scales from five fish will be mounted on each slide. The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers that correspond with their place on the AWL form (Appendix A4). After sampling, the fish will be moved to the aerated recovery bucket and held until all smolt are swimming normally. Both the recovery and pre-sampling holding buckets will be covered to minimize stress on the fish.

AWL data will be collected and recorded in a notebook dedicated to smolt sampling. Data will then be transferred to AWL forms. Personnel collecting the data will record their names on the AWL form. Instructions for filling out AWL forms can be found in Appendices A5 and A6.

All data (slides, forms) will be forwarded to the Kodiak area office and reviewed throughout the field season. Keep data and samples updated daily in the event that data must be sent to town on short notice. The crew leader will be responsible for editing all AWL forms for errors prior to sending forms to the Kodiak office.

Common mistakes to avoid include:

1. Poorly mounted scales - Too many scales in a smear or slime and debris present when mounting. The rows of scales should not be too close together to avoid confusing scales from two different smolt.
2. Numbering AWL form improperly - For example, if 40 smolt are sampled in one day (day 1), the AWL numbers should be started at AWL 001 for the first 40 smolt sampled (fish 1-40; 8 slides). The next day will start with AWL 002 (fish 1-40) and so on. If there are not 40 smolt to be sampled for that day, smolt sampled the next day will be started on a new AWL form.
3. Damaged AWL forms - do not bend, fold, tape, staple, etc. these forms. Otherwise, the computer will not read them correctly.
4. Scales removed from one fish contaminating the scale smear of the next fish - wipe the scalpel blade off between each fish sampled.

## **PHYSICAL DATA**

Physical data will be collected daily between 1100 and 1200 hours. Information will be recorded on the *DAILY PHYSICAL OBSERVATION FORM* (Figure 5) and will include water temperature, air temperature, water depth, percent cloud cover, wind direction and velocity, and precipitation. A depth gauge will be placed upstream of the weir to determine the water level on a daily basis.

## **OTHER REQUIREMENTS**

### **SAFETY**

Each employee will receive CPR and First Aid Certifications as required by the ADF&G Standard Operating Procedures (SOP), prior to assignment to the Afognak project. In addition, each employee will review the required sections of the ADF&G guidelines.

Specific guidelines to review include:

Safety Policy Standards

Building Safety

Field Camp Safety

Aircraft Passenger Safety

Emergency Survival Equipment Required in Aircraft

Boating Safety

Vehicle Safety

Laboratory Safety

Small Tool Handling

Firearm and Bear Safety



Project crew leaders will be responsible for providing the necessary equipment and information to field technicians. The ADF&Gs field safety policy will need to be reviewed by each field crewmember prior to field assignment. Each employee is responsible for reviewing the safety training materials.

This field camp is located in bear country and trash produced from this camp will be handled in a responsible manner. All organic matter will be disposed of in the river. All burnable materials will be burned in the barrel on-site. When burning, the barrel will be closely monitored to prevent grass fires. All inorganic or unburnable materials will be shipped to town via the next available chartered plane, and will be doubled-bagged using regular trash bags before the trash is put on the plane.

## **TRAINING**

In addition to mandatory CPR and First Aid training, all field personnel will receive training on Salmon Sampling Protocols in the field. Also, personnel will be trained in proper use of firearms before departing from town or at the field camp.

## **RADIO SCHEDULE**

The Commercial Fishery Division morning radio schedule is from 0800-0845 hours daily and camp personnel will need to be prepared with weir escapement counts for radio schedule on the Single Side Band (SSB) radio. During the smolt season, Kodiak Research office personnel will contact field camps by Satellite phone on the dispatch service at 1300-1315 (1:00-1:15 PM) hours Monday through Friday and at 1900 (7:00 PM) hours on Saturday and Sunday. If contact is necessary at other times, information can be relayed via the Commercial Fishery Management Section schedule at 0800 and 2000 hours. The emergency Coast Guard frequency is **4.125 kHz**.

Instructions on the operation and transmission of the satellite phone is provided in Appendix B. Crew leaders must train crew members in proper use of the satellite phone and SSB radio. In order for crewmembers to become more familiar with operating the radio, the crew leader should have the crew member talk with the Management biologist during 2000 hour radio schedule to pass along weir data. The Afognak camp is located in the southeastern corner of Afognak Island and the coordinates for the site will be provided by the Management Biologist.

## **AIR CHARTERS**

All air charters will be set up through Kodiak office staff. Appropriate information in regard to charters will be relayed through daily radio contact. It is important to contact office personnel when any data, equipment or other freight will be "back hauled" to Kodiak.

## **REPORTING**

Crew leaders will be responsible for recording all of the job activities and compiling biological data. Data forms and a field log will be completed daily. "Rite in the rain" logbooks will be used while collecting data and data will be transferred to data forms after returning to the cabin. Use a number 2 pencil when filling in the AWL forms. Data will be reported to Kodiak staff via satellite phone. Completed data forms will be sent to Kodiak as planes permit. Data that is sent to Kodiak will be properly packaged and labeled. **Data forms (not AWL forms) will be duplicated in case originals are misplaced in transit.**

A one-page report of project activities will be sent to town bi-weekly, or on the next available plane (Appendix C).

## **CAMP INVENTORY AND CLOSE UP**

The Afognak Lake smolt project equipment will be inventoried prior to camp close up. Inventory forms will be provided. Items of high value will be returned to Kodiak and a list will be made of the equipment needed for the next field season. The Salmon Management Biologists will provide direction on properly securing the cabin and out buildings prior to the field crew leaving the camp site for the season.

## **PHOTO DOCUMENTATION**

Crew leaders will be responsible for photo documenting project activities. Specific aspects such as trap installations, weir construction, and other detailed tasks are important to photograph. When possible, ADF&G cameras and film will be used. If, however, State cameras are not available, film will be provided for use with personal cameras. The use of personal cameras is suggested in this case, but not required. The ADF&G will pay for developing film.

## **TIMESHEETS**

Forward timesheets to the KODIAK OFFICE by the 15<sup>th</sup> and last day of each month! Plan ahead to ensure that timesheets arrive in town on time. To ensure that timesheets are properly filled out, instructions are contained in Appendix D1 and an example of a properly filled out timesheet is provided (Appendix D2). Plan work activities to be completed in a 7.5-hour day; work overtime only if pre-authorized by the project biologist.

Crew leaders should take the time to look over each crewmember's timesheet before sending them to town to ensure that they are properly filled out.

## **PURCHASING**

During the field season, field crews will need additional items (e.g., groceries, fuel, or tools). Small lists can be read over the satellite phone; however, these lists should be limited to just a few items. Blank grocery lists will be sent to the field and the crew leader should remember to send orders in advance to ensure the correct grocery order for the next supply flight. It should also be remembered that the Afognak Lake budget allocates \$20/day/person and this allocation will not be exceeded. Crew leaders should track grocery expenses and limit the number of requested specialty items. Plan ahead when requesting fuel for heating the camp. In the past, camps have left stoves on during the day while the crew was working outside. This practice is not acceptable and heating units will need to be turned off, when the cabin is unoccupied.

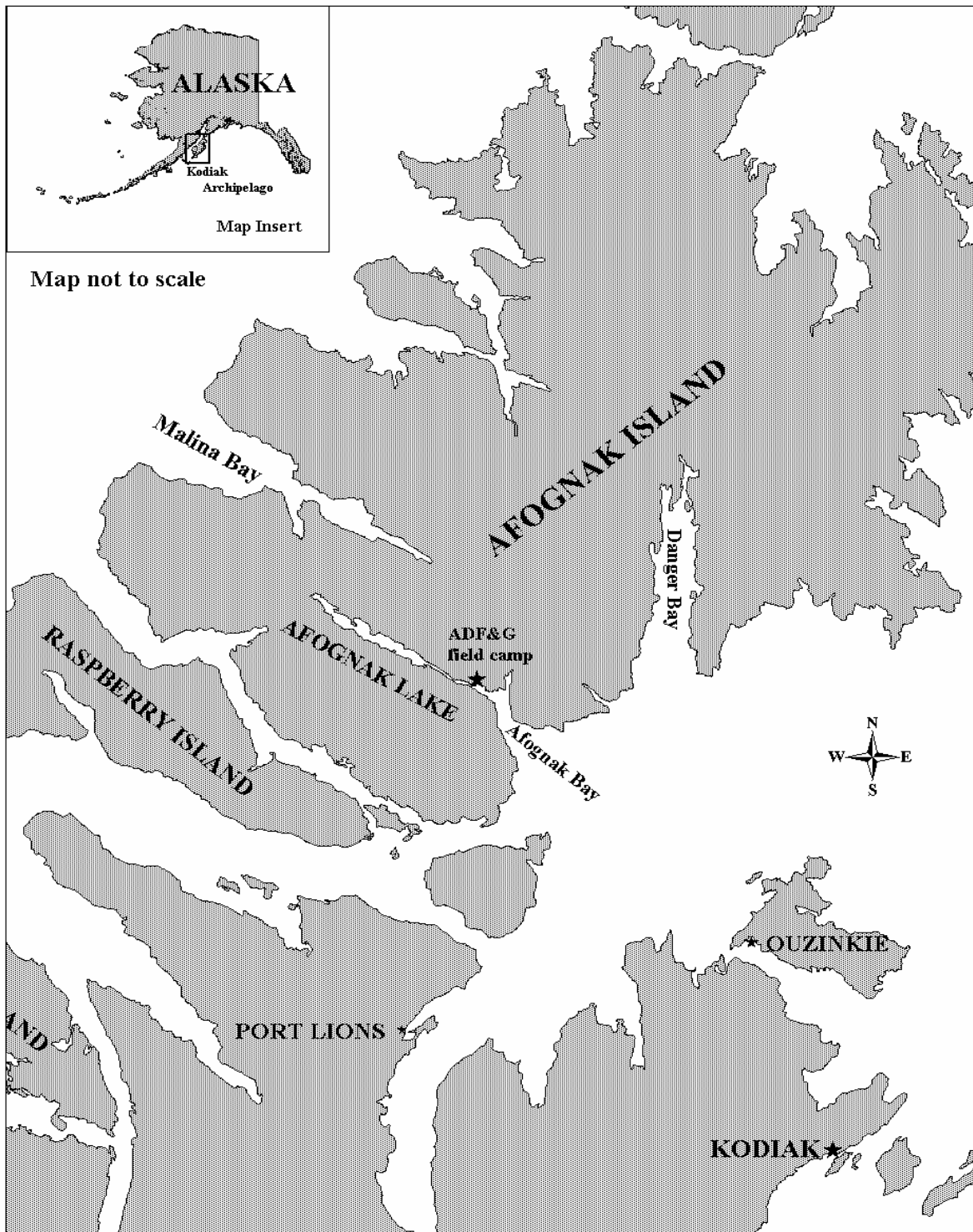
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## **FIGURES**



**Figure 1.**-Location of the ADF&G camp along the Afognak River and Afognak Lake on Afognak Island.

## page\_\_\_\_\_of\_\_\_\_\_

TRAP LOCATION: **AFOGNAK RIVER (ADF&G CABIN SITE)**

[illegible]

<sup>1</sup> Catch number includes mortalities but does not include marked recoveries.

<sup>2</sup> To be included in comments: Significant water level changes, any difficulties determining marked fish, problems, observations, etc.

**Figure 2.-**Daily smolt trap catch reporting form.

page\_\_\_\_\_of\_\_\_\_\_

TRAP LOCATION: Afognak River (ADF&G cabin site)

[illegible]

<sup>3</sup> Includes both trap and live box mortality.

**Figure 3.-Sockeye salmon smolt summary form.**



SMOLT DYE RELEASE FORM

page\_\_\_\_\_of\_\_\_\_\_

DATE (actual): \_\_\_\_\_

CREW NAMES (Print) \_\_\_\_\_

PROJECT LOCATION: **Afognak** \_\_\_\_\_

NUMBER OF FISH COLLECTED: \_\_\_\_\_  
(from live box)

	COLLECTION LIVE BOX	DYE TUB	RECOVERY CONTAINER	TRANSPORT BUCKET	STREAM RELEASE
START TIME (military)					
START TEMP (degree celsius)					
END MORTALITY (number of fish)					
OXYGEN SUPPLEMENT O <sub>2</sub> or aerator(A)					

DYE SOLUTION (mixture): \_\_\_\_\_ DYE (grams); \_\_\_\_\_ WATER (gallons)

RELEASE SITE LOCATION (distance upstream of trap site, in meters): \_\_\_\_\_

TOTAL NUMBER OF DYED FISH RELEASED: \_\_\_\_\_

COMMENTS:

Figure 4.-Smolt dye release form.

## DAILY PHYSICAL OBSERVATIONS

PROJECT: **Afognak**

YEAR: 2007

page\_\_\_\_\_of\_\_\_\_\_

[illegible]<sup>1</sup> Weir Site = W; Smolt Site = S

**Figure 5.-**Daily physical observation form.

## **APPENDIX A. SMOLT AGE-WEIGHT-LENGTH SAMPLING**

## **Appendix A1.-Smolt age-weight-length (AWL) sampling materials and methods.**

---

Annually, outmigrating salmon smolt are sampled for age (scales), weight, and length, by field crews throughout the Westward Region. These data are essential for sound management of the State's salmon resources.

To be useful, data must be recorded on the age, weight, length (AWL) optical scanning (opscan) forms neatly and accurately. In addition, scale samples must be collected and mounted properly to ensure accurate age determination. The following procedures are to be strictly adhered to when sampling juvenile salmon for age, weight, and length.

Complete each section on the left side of the AWL form using a No.2 pencil and darken the corresponding circles as shown in the figures. Make every effort to darken the entire circle as the optical scanner, which reads and records the data from the AWL forms, may not recognize partially filled circles. Be sure to transfer the litho code, located in the left margin on the front side of the AWL form to the back side of the form by darkening the appropriate circles.

Label only one form at a time to avoid a "carbon paper effect" resulting in stray marks. Special care should be used to ensure that stray marks do not occur on either side of the AWL form. Stray marks and scuffed AWL forms can severely hamper scanning. The AWL forms should be treated carefully; the scanner in the Kodiak office cannot read damaged forms. The forms should not be stapled, bent, paper-clipped or folded. Specific instructions for completing AWL forms are listed in Appendix A5 and an example of an AWL form filled out for smolt sampled can be found in Appendix A6.

All juvenile salmon AWL data will be recorded in a field notebook dedicated to smolt sampling. These data will then be transferred from the field notebook to the AWL forms. Each species will have its own AWL sample number series that runs sequentially throughout the season. Up to 40 individual fish per smolt day may be included in one AWL sample. If more than 40 fish are sampled in a single smolt day, then multiple AWL numbers will be used on that day. For example, if 70 sockeye salmon smolt are sampled in a single day (day 1), the AWL numbers will be AWL #001 (fish 1-40; 8 slides) and AWL #002 (fish 1-30; 6 slides). The next day will start with AWL #003. Each day's sample will start with a new AWL number.

Smolt will be sampled as soon as possible after they are captured. The smolt will be transported in clean, 5-gallon gallon buckets to the sampling area. An additional bucket of water will be used as a recovery bucket. Buckets containing smolt will be filled with fresh, clean water and aerated. The buckets will be covered when possible to avoid stress on the fish.

Tricane Methanesulfate (MS-222) will be used to anesthetize the smolt; latex gloves will be worn to prevent direct exposure to the anesthetic. The use of this chemical will be demonstrated by experienced personnel. A small amount (approximately 1 g) of MS-222 and a small amount of baking soda will be dissolved in approximately 2 L of cold water. The amount of anesthetic used will vary depending on the water temperature, freshness of the chemical, and size of the smolt. A few smolt will be placed in the anesthetic solution until subdued to a point where they can no longer flex their axial musculature but can still ventilate their gills. The concentration of the solution should be such that it immobilizes the fish in 2-3 minutes. After the fish are anesthetized, it is important to sample them quickly and place them in a recovery container to prevent mortality.

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-Continued-

After the smolt have been immobilized, excess water will be gently removed from the fish using a paper towel or a wet sponge as a blotter. Place the fish on its right side to sample the left side. Measure smolt length, to the nearest mm, from tip-of-snout to tail fork (Appendix A3). Record length by blackening the appropriate column circles on the front side of the AWL form. When collecting length data, take care to ensure that each length corresponds to the appropriate scale smear mounted on the slide, as length-at-age is evaluated for each sample. Weigh each smolt to the nearest 0.1 g, and record the weight by blackening the appropriate column circles on the back side of the AWL form.

On salmon species, the preferred scale is located where a straight line between the posterior insertion of the dorsal fin and the anterior insertion of the anal fin crosses the second scale row dorsal to the lateral line. In smolt, the area directly around this scale is considered the preferred area (Appendix A3). If scales are not present in this area then scales should be taken from the secondary location, which is the same area on the right side of the fish. A scalpel will be used to remove 5-10 scales from the preferred area. These scales will be mounted on a glass slide using a probe to position the scales. Scales from five fish will be mounted on each slide. The scalpel will be wiped clean of scales and slime between each fish. A diagram of a slide with scales mounted correctly is located in Appendix A4.

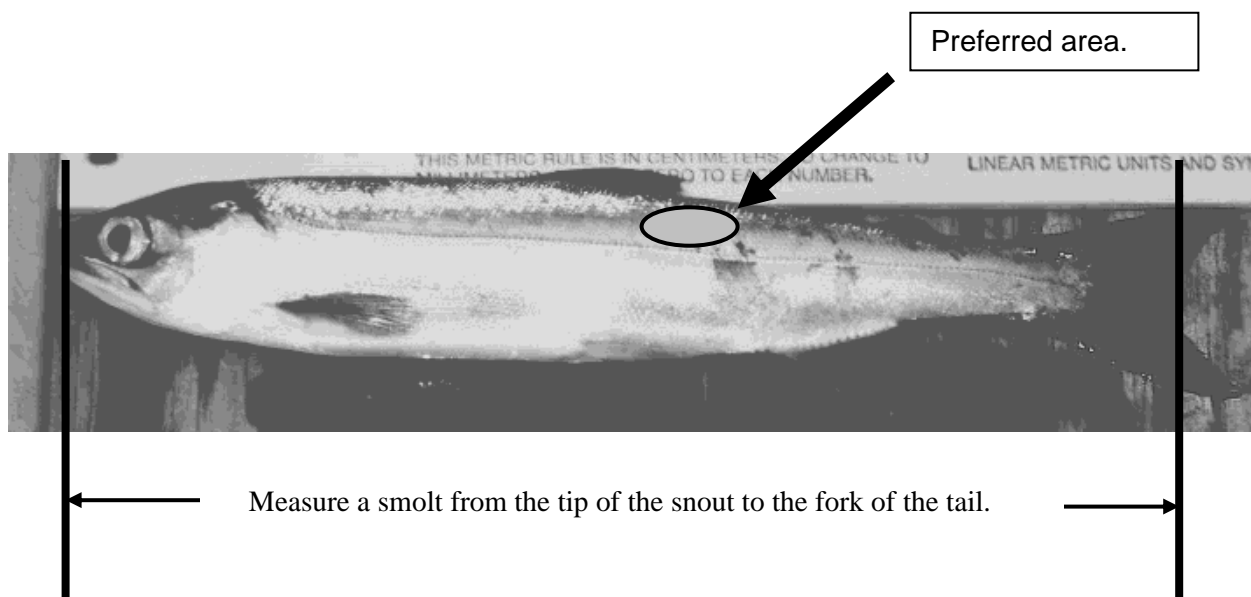
The left portion of each slide will be labeled with AWL number, sample location, species, date, and inclusive fish numbers. A diagram of a properly labeled slide is located in Appendix A4. After sampling, fish will be held in a recovery container until they are swimming normally and then released downstream of the trapping location. When the slides are completed, return them to the box in order by AWL # and fish #. Label the slide box on top with the information listed in Appendix A4.

---

**Appendix A2.-Sampling weeks and associated calendar dates.**

Week	Calendar Dates	Week	Calendar Dates
1	01-Jan to 07-Jan	28	09-Jul to 15-Jul
2	08-Jan to 14-Jan	29	16-Jul to 22-Jul
3	15-Jan to 21-Jan	30	23-Jul to 29-Jul
4	22-Jan to 28-Jan	31	30-Jul to 05-Aug
5	29-Jan to 04-Feb	32	06-Aug to 12-Aug
6	05-Feb to 11-Feb	33	13-Aug to 19-Aug
7	12-Feb to 18-Feb	34	20-Aug to 26-Aug
8	19-Feb to 25-Feb	35	27-Aug to 02-Sep
9	26-Feb to 04-Mar	36	03-Sep to 09-Sep
10	05-Mar to 11-Mar	37	10-Sep to 16-Sep
11	12-Mar to 18-Mar	38	17-Sep to 23-Sep
12	19-Mar to 25-Mar	39	24-Sep to 30-Sep
13	26-Mar to 01-Apr	40	01-Oct to 07-Oct
14	02-Apr to 08-Apr	41	08-Oct to 14-Oct
15	09-Apr to 15-Apr	42	15-Oct to 21-Oct
16	16-Apr to 22-Apr	43	22-Oct to 28-Oct
17	23-Apr to 29-Apr	44	29-Oct to 04-Nov
18	30-Apr to 06-May	45	05-Nov to 11-Nov
19	07-May to 13-May	46	12-Nov to 18-Nov
20	14-May to 20-May	47	19-Nov to 25-Nov
21	21-May to 27-May	48	26-Nov to 02-Dec
22	28-May to 03-Jun	49	03-Dec to 09-Dec
23	04-Jun to 10-Jun	50	10-Dec to 16-Dec
24	11-Jun to 17-Jun	51	17-Dec to 23-Dec
25	18-Jun to 24-Jun	52	24-Dec to 30-Dec
26	25-Jun to 01-Jul	53	31-Dec
27	02-Jul to 08-Jul		

**Appendix A3.**-Photo of a smolt with the preferred area highlighted.



**Appendix A4.**-An example of 2 correctly labeled smolt slides representing fish 1 through 10 from a sample collected on 5/11/00.

---

AWL 001 Sockeye Bear Lake 5/11/00 Fish 1 - 5	1 • • • • • • •	• • • • • • •	• • • • • • •	• • • • • • •	5 • • • • • • •
AWL 001 Sockeye Bear Lake 5/11/00 Fish 6-10	6 • • • • • • •	• • • • • • •	• • • • • • •	• • • • • • •	10 • • • • • • •

When the slides are completed, return them to the box in order by AWL # and fish #, and label the slide box on top with the following information:

Location: Bear Lake

AWL Number: AWL 001-003

Beginning and end dates: 6/12-7/13/00

Sockeye Salmon Smolt

---



## **Appendix A5.-Procedure for recording salmon smolt age-weight-length data on AWL forms.**

---

Smolt length and weight will be recorded on AWL forms (Appendix A5). Using a No.2 pencil, complete each section of the left side of the AWL and darken the corresponding ovals.

Fill out each of the following:

### **Description**

Record the following: species, location, year and samplers names (e.g., sockeye smolt, Afognak, 2006, Sagalkin, Schrof).

### **Card**

The AWL forms and corresponding slides are numbered sequentially date throughout the season starting with 001. A new, consecutively numbered AWL form is used each day even if the previous AWL form is not full. There may be a minimum of one fish and a maximum of 40 fish (8 slides) per AWL form.

### **Species**

Refer to the reverse side of the AWL form for the correct one digit code (e.g., sockeye = 2).

### **Day, Month, Year**

Use appropriate digits for the date the fish are sampled.

### **District**

List the district in which the fish were sampled. Consult your area statistical map or project leader for the appropriate district (**Afognak district is 252**).

### **Subdistrict (Section)**

List the subdistrict in which the fish were sampled (**Afognak subdistrict is 34**).

### **Stream**

List the stream in which the fish were sampled. Consult your area statistical map or project leader for the appropriate stream number (**Afognak stream is 342**).

### **Location**

List the location in which the fish were sampled. Consult your area statistical map or project leader for the appropriate stream number (**Afognak location is 034**).

---

-Continued-

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**Period**

List the period (sample week) in which the fish were sampled (Appendix A5).

**Project and Gear**

Refer to the reverse side of the AWL form for the correct code. For example, smolt samples collected in a trap would have a project code of **8** and a gear code of **00**.

**Mesh**

Leave blank unless specifically instructed by supervisor to do otherwise.

**Type of length measurement**

Refer to the reverse side of the AWL form for the correct code (e.g., tip of snout to tail fork = **2**). Refer to Appendix A1.

**Number of scales per fish**

Fill in the number of scales (smears) collected per fish. For smolt, one scale smear per fish is collected.

**# of cards**

# of cards always = 1 (each AWL form is individually numbered).

If possible, keep the AWL forms in numerical order throughout the season and keep all forms flat, dry, and clean. Remember, when sampling smolt, weight data is recorded on the back side of the AWL form and the litho code, located in the left margin on the front side of the AWL form must be transferred to the back side of the form (see Appendix A4). The litho code is the number unique to each AWL form and copying the litho code from the front to the back of the form indicates weight data was transcribed on the back of the form for the Optical scanning machine to read. Fish slime and water curling may cause data to be misinterpreted by the optical scanning machine. It is the responsibility of the crew leader to make sure that all forms are carefully edited before returning them to their supervisor.

---

-Continued-

**Appendix A6.-Example of an AWL form filled out for smolt sampled (Note: Project code should be 8 not 4).**

*Penksey/Thomas 1999*  
**DESCRIPTION:** *Snakey Smolt / Hidden Creek / Dip Net*

**ADF&G ADULT SALMON AGE-LENGTH FORM VERSION 2.1**

**CARD:** 001

**SPECIES:** 2

**DAY:** 04

**MONTH:** 06

**YEAR:** 99

**DISTRICT:** 251

**SUBDISTRICT:** 40

**STREAM:** 406

**LOCATION:**

**PERIOD:** 23

**PROJECT:** 4

**GEAR:** 13

**MESH:**

**TYPE OF LENGTH MEASUREMENT:** 1

**NUMBER SCALES/ FISH:** 1

**# OF CARDS:** 1

Mark Refill by MCS 58020000-1 PECO Printed in U.S.A.

**DO NOT WRITE IN THIS MARGIN**

**DO NOT MARK IN THIS MARGIN**

**TRANSFER RESPONSES EXACTLY AS PRINTED ON FRONT TO THIS GRID**

**SPESIES**

1 - Chinook (King)  
2 - Snakey (red)  
3 - Coho (silver)  
4 - Pink (humpy)  
5 - Chum (dog)

**PROJECT**

1 - Commercial catch  
2 - Subsistence catch  
3 - Esquiment (lower, weir, sear, etc.)  
4 - Esquiment - spawning grounds  
5 - Test fishing  
6 - Sport catch (marine)  
7 - Sport catch (freshwater)

**GEAR TYPE**

0 - Trap  
1 - Pines seine  
2 - Beach seine  
3 - Drift gillnet  
4 - Set gillnet  
5 - Trawl  
6 - Long line  
7 - Other trawl  
8 - Handnet  
9 - Poth  
10 - Sport hook and line  
11 - Herring paros seine  
12 - Handpiked  
13 - Dip net  
14 - 18 Shallowpond  
15 - Bean trawl  
16 - Shovel  
17 - Weir  
18 - 99 Unassigned

**LENGTH TYPE**

1 - Tip of snout to fork of tail  
2 - Mid-eye to fork of tail  
3 - Post orbit to fork of tail  
4 - Mid-eye to hypural plate  
5 - Post orbit to hypural plate  
6 - Unassigned

**AGE ERROR CODES**

1 - Double  
2 - Inverted  
3 - Regenerated  
4 - Unusable  
5 - Missing  
6 - Not counted  
7 - Wrong species  
8 - Not preferred



## **APPENDIX B. SATELLITE TELEPHONE AND DISPATCH INSTRUCTIONS**

## Appendix B1.-Satellite telephone and dispatch instructions.

---

The following information serves as a Policy Statement regarding the allowable uses of ADF&G satellite phones and Instructions on the proper method to successfully set up and operate the satellite phone system assigned to your camp.

These systems are not like standard telephones or cell phones, nor are they like a single side band or VHF radio. Communication is sent through the transmitter to low level satellites, then is beamed down to ground stations, either directly to another satellite phone system or to a switching station linked to standard telephone lines. As such, there is a much higher cost involved in operation than with standard telephone long distance or cell phone charges.

Under no circumstances may you use this satellite phone system for personal calls, unless a family or personal emergency exists. This does not mean that field crew leaders may grant permission for personal use of this phone. Only the project biologist may give you such permission. ANY DELIBERATE MISUSE OF THIS SYSTEM, SUCH AS MAKING UNAPPROVED, NON-EMERGENCY, OR PERSONAL CALLS, WILL RESULT IN DISCIPLINARY ACTION, WHICH MAY INCLUDE SUSPENSION OR DISCHARGE.

The primary purpose for having this satellite phone is for secure, reliable communications between remote field stations and ADF&G offices (Kodiak, Chignik, Cold Bay, Sand Point, or Port Moller), ADF&G research vessels (Resolution or K-Hi-C), Fish and Wildlife Protection vessels and offices, or other field camps that are similarly equipped. The secondary purpose is for your SAFETY. With these phones you are capable of directly dialing emergency services at any time of the day or night. It is essential that these phone systems are maintained in good working order, are fully charged or hooked to sufficient power at all times, and remain free for official or emergency use.

### INSTRUCTIONS

The portable sat phone unit must be charged with power. There is an internal battery pack, and a 12-volt adapter is available in order to hook the phone to a larger battery bank, that may in turn be recharged by generator or solar panels.

Turn the unit on using the power switch in the lower left corner. A green light, just above the switch, should come on indicating that the unit is sufficiently powered. If no light or a red light comes on, you will need to charge the unit, or attach it to your 12-volt battery bank via the appropriate connections.

The back, or top, of the briefcase-like unit is the antenna, and it must be oriented correctly in order to access the receiving satellite. The top of the case should be open and pointed in a general east-southeast direction. You must have a fairly clear line-of sight to the horizon in that direction; this unit will NOT work through walls or mountains. The angle of the antenna should be almost vertical; remember to lock the support arm that attaches the lid to the main body of the unit, along the right side.

This system has two means for calling; a telephone-like handset (for dial in or dial out phone calls), and a push-to-talk microphone (for 'dispatch', unit to unit, calls). All calls made with the handset are billed per minute of use, at an expensive rate. All calls on the 'AlaskaNet' dispatch system, using the microphone, are essentially FREE.

When first turned on, the handset and microphone should become active, with the display panels on the top of the phone handset and microphone lighting up (one LED panel, hopefully the one on the handset, should read SLEEP). The display will show, after a few moments, whether a connection has been established with the satellite, and how strong the signal is (ex. *B05 S 21*). Turn the unit slightly, and raise or lower the lid/antenna slightly until the highest possible signal strength is indicated (normally above 20 but will work down to 8). Lock the lid/antenna in place and do not turn the unit again, until your communications are finished. Once a strong signal is acquired push the "\*" button for 2 seconds. Wait until there is a "beep" and the LCD screen displays '00:DN ??', then dial the number.

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### Alaska Dispatch System

Because all calls made on the dispatch system are FREE, this is the method of choice for using the satellite phone units. There are several ADF&G offices, many field camps, and two research vessels on the AlaskaNet dispatch system, as well as Fish and Wildlife Protection/State Troopers offices and vessels, plus many canneries, fishing vessels, and tenders. You should have received a 10-12 page directory with your phone.

First, make sure the unit is turned on, and that there is sufficient power. Set the unit up so that the signal strength is at the maximum for your location. You should see the signal strength on the microphone display (ex. *B05 S 21*), and the handset display should read SLEEP. Once a strong signal is acquired push the "\*" button for 2 seconds. Wait until there is a "beep".

On the microphone display, below the signal strength, there should be a query, '00:DN ??'. This is asking you to 'dial' in the 4-digit dispatch number that you wish to call. After you have entered the 4-digit dispatch number of the unit you wish to contact, hold in the microphone key and a connection will be made with the satellite, which will then try to connect with the dispatch number you punched in. IF a connection is made you will hear two beeps ("bird chirps") and the microphone display will read SELF. While continuing to hold in the microphone key, call the station you wish to talk to. USE ALL THE SAME FORMALITIES AS WHEN CALLING ON A SSB RADIO. For example, say "Calling the ADF&G Kodiak Office, Calling the ADF&G Kodiak Office; this is Karluk Weir". When you release the microphone key, the unit will beep again.

BE PATIENT. It will take some time for the signal to go up to the satellite, down to the number you called. It may take the other party some time to get to the microphone and respond (this is especially true for calls to the ADF&G office; supervisors have to walk down to the radio room to respond). When they respond, their 4-digit dispatch number (DN) will show on the microphone display. This is a private conversation, unlike the previous dispatch service.

Just remember to be patient; wait until the other party stops speaking and you hear the unit beep (indicating that they are finished with this portion of their communication), the display should read SELF, and you may key microphone to talk. Then you must again wait for the other party to respond. If the other party is not there, they simply will not answer. If the satellite connection cannot be made, the display will read 'Unable to Connect' or 'Not Available'.

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-Continued-

## Phone System

DO NOT USE THE HANDSET TO PLACE CALLS UNLESS ABSOLUTELY NECESSARY. All calls made with the handset are billed per minute of use, at an expensive rate. Calls should only be made to supervisors, either when radio or dispatch contact is not possible or when a confidential message needs to be relayed. Calls are made by dialing out, almost like a standard telephone. Punch in the area code and telephone number, then PRESS SEND (button located in the upper right corner of the handset). Because there is a satellite relay, there will be a slight delay between when you speak and when the other party hears you, so be patient.

Note EVERY call in a phone logbook. The system will show you the amount of time you've used on the call, on the LED panel. Note the number called, the date, approximate time, and the length of the call (minutes and seconds). When the call is completed, you MUST push the END button (top right corner of handset buttons), otherwise the system will remain active and YOU will be billed for the time (at almost a dollar a minute). Remember, PRESS END.

If someone calls in to this unit, it will ring, like a standard telephone. Press the SEND button to start the conversation, but remember to PRESS END to finish the call. ADF&G is billed for all calls made using the handset, both the calls you dial out and any calls dialed in.

### IN CASE OF EMERGENCY:

If there is a medical emergency, or a real danger to life or health, IMMEDIATELY call the US Coast Guard Rescue Coordination Center at 800-478-5555. Be ready to tell them your name, exact location (latitude and longitude or nearby major landmark), and the exact nature of your emergency. They may question you extensively, so be prepared. There are emergency doctors on-call that can advise you. After the call is completed, immediately call your supervisor, at work or at home, and relay the details of your experience.

If there is an enforcement emergency, use the dispatch microphone to call the Kodiak office or the Alaska State Trooper, Fish and Wildlife Protection (DN 6370).

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## **APPENDIX C. WEEKLY REPORT EXAMPLE**

**Appendix C1.-An example of a weekly report.**

---

To: Rob Baer  
Alaska Department of Fish and Game  
Fishery Research Biologist  
Kodiak, Alaska

Date: May 20, 2006

From: Jason Fox  
Alaska Department of Fish and Game  
Fish and Wildlife Technician III  
Litnik Field Camp

Subject: Activity Report for May 14-20, 2006

**Smolt Counts & Sampling**

The smolt trap here has been fishing since May 10<sup>th</sup>, but we saw our first smolt on May 16<sup>th</sup>. Our cumulative catch thru this week is 83. The run seems to have started later this year due to lake freezing and winter-like conditions in the Kodiak/Afognak area until early May. We also sampled 20 smolt on May 19<sup>th</sup> as an introductory example for new crewmate Josephine Deguzman. The smolt we sampled had an average length of 81.2mm and an average weight of 4.0g.

**Dye Test and Trap Efficiency**

We have not yet had enough fish to do a dye release test. As far as putting in the smolt trap is concerned, we were not originally able to get the incline into “optimal” position due to high water conditions at the time of installation. As we found out last year, this may be a problem when *low* water conditions occur, as the catch box may not be able to be lowered any further than a potential high spot that it is currently over. This will be addressed as the season goes on.

**Adult Weir Counts**

The adult sockeye weir was installed and fish tight at 7pm on the evening of May 19<sup>th</sup>. Surveys of the lagoon and lower river below the weir revealed no signs of returning adults yet. We have not counted any adults upstream as of yet.

**Miscellaneous**

River otters have been a very significant nuisance so far this season. We have installed a protective cage around the area between the cod end of the incline where fish drop into the catch box. Last year, this seemed effective. However, the chicken wire tends to gather a significant amount of river debris in high water conditions. This debris buildup also tends to cause an increase in smolt mortality because the smolt have to get through the debris to the catch box.

**Anticipated Activities**

Crew will have to maintain a clean trap to reduce mortality in smolt. We also are going to monitor adult steelhead out-migration this spring to experiment with effective ways to pass them downstream. We also need to fill sand bags to add to weir and smolt trap to make them more secure and fish tight.

---



## **APPENDIX D. TIMESHEET INSTRUCTIONS**

## Appendix D1.-Instructions for filling out a timesheet.

---

All ADF&G employees must fill out a time sheet biweekly and these timesheets must be turned in to the Administrative staff in Kodiak in a timely manner. Please follow these instructions when filling out your time sheets to avoid payroll problems. When a flight comes out to drop off groceries, or for any other reason, near the end of a pay period, camp personnel need to send in their timesheets. Fill in the time sheet up to the day you send them in and attempt to project your remaining hours worked.

Fill out each of the following on the top of the timesheet:

**Pay period:** pay periods start on the 1<sup>st</sup> or 16<sup>th</sup> of each month and end on the 15<sup>th</sup> or end of the month (example: June 1-15 or June 16-30).

**SSN:** your social security number

**Name:** full name

**Division:** Commercial Fish

In the actual timesheet table fill in the following:

**Day:** Monday, Tuesday, etc.

**Date:** 6/16, 6/17, etc.

**Hours worked box:** start and stop time in military time

**Code 1:** fill in the number of hours worked for that day (see example in Appendix D.2.).

**Work hours and Code 1 Totals** should both equal the sum of daily hours worked. If your time sheet is sent in before the end of the pay period, project your time for the remaining days so you can total your columns.

**Charge to Table** located on the bottom left hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

**Comments Table** located on the bottom right hand side of the time sheet should be left blank unless otherwise instructed by your project supervisor.

**Employee's signature and date:** Be sure to sign and date your timesheet.

**Crew leaders are responsible for reviewing each crew member's timesheet before sending them to town to ensure that they are properly filled out.**

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## 37

Ver. 1.9.4  
Revised 2/2009



## ALASKA DEPARTMENT OF FISH AND GAME

### *DIVISION OF COMMERCIAL FISHERIES*

#### MEMORANDUM

TO: Switgard Duesterloh  
Fisheries Biologist II  
Division of Commercial Fisheries  
Region IV - Kodiak

DATE: April 23, 2007

PHONE: (907) 486-1872

FROM: Steven Thomsen  
Fisheries Biologist I  
Division of Commercial Fisheries  
Region IV - Kodiak

SUBJECT: 2007 Operational Plan

#### Near Island Limnology Laboratory and Kodiak Archipelago Lake Assessment Project Operational Plan, 2007

#### **Introduction**

The Lake Assessment Project for the Kodiak and Afognak Islands was started in the mid-1980s as part of a salmon comprehensive plan to examine and prioritize the region's sockeye salmon *Oncorhynchus nerka* production potential (Schrof et al. 2000). As part of the Kodiak Regional Comprehensive Salmon Plan, limnological and fishery investigations were initiated simultaneously to determine the appropriate enhancement and/or rehabilitation strategy for depressed sockeye salmon stocks or the stocking potential of barriered lakes without anadromous fish (Honnold et al. 1996).

The current project consists of limnology field sampling and laboratory processing of samples from 14 Kodiak and Afognak Island lakes (Table 1; Figure 1). Samples collected from Big and Little Waterfall, Karluk, Spiridon, Crescent, Frazer, Hidden, Laura, Little Kitoi, Ruth, Saltery, Upper Malina, and Upper and Lower Jennifer Lakes as part of the KALAP are processed at the Alaska Department of Fish and Game (ADF&G) Near Island Laboratory (NIL). Water chemistry, nutrient and zooplankton samples, and light attenuation, temperature, and dissolved oxygen measurements from each lake are collected, and data are compiled at the NIL.

In addition, Afognak Lake is monitored as part of the U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring (FRM) Program (project 04-412; Honnold and Schrof 2004; Table 1; Figure 1). The FRM project goals, objectives, and methods are comprehensively covered in the specific project operational plan (ADF&G 2007).



The NIL has been processing zooplankton samples sent from the ADF&G, South East for the past three years. In 2007, zooplankton samples from seven lakes located in Southeast Alaska will also be processed and the data summarized at the NIL (Table 1).

Several NIL projects have been discontinued in 2007. Processing of limnology samples from Chignik, Black, and Bear Lakes, located on the Alaska Peninsula and funded through the Chignik Watershed Ecological Assessment Project will not continue in 2007. Nutrient samples from Salmon Lake located near Nome will not be processed at the NIL in 2007. Funding for extensive studies at Karluk and Spiridon Lakes through the Exxon Valdez Oil Spill Council (EVOS), Gulf of Alaska Ecosystem Monitoring (GEM) program will not continue in 2007.

### **Goals**

1. Provide sampling logistics and laboratory support for limnology in the Kodiak area and assist ADF&G programs in other regions with their sample processing needs if capacity allows.
2. To assess the primary and secondary production of selected sockeye salmon nursery lakes in the Kodiak Archipelago.
3. To monitor rearing habitat of selected salmon systems to assist in lake management to maintain productive juvenile rearing and subsequent adult production.

### **Objectives**

1. Measure water chemistry, nutrient, and chlorophyll *a* concentration from samples collected to estimate the seasonal mean water chemistry, nutrient, and chlorophyll *a* concentrations by unit volume.
2. Quantify and measure each species of macrozooplankton from samples collected to estimate the seasonal mean density, biomass, and size of each of the species.
3. Collect light attenuation data to estimate the compensation depth (EZD) for algal photosynthesis.
4. Determine the temperature and dissolved oxygen regimes.

### **Tasks**

#### ***Field Sampling***

1. Collect lake water at 1 m depth from Hidden Lake (Schrof and Honnold 2003) at six week intervals.
2. Collect lake water at 1 m depth from Afognak (station one) Lake (Schrof and Honnold 2003) at five week intervals.
3. Collect lake water at 1 and 50 m depths from Spiridon (stations one and two) Lake at five week intervals (ADF&G 2007).

4. Collect one vertical zooplankton tow from a depth of 1 m off the bottom from Upper Malina, Little Kitoi, Hidden, Upper and Lower Jennifer, Ruth, Saltery, Crescent, Laura, and Big and Little Waterfall Lakes (Schrof and Honnold 2003) at six week intervals.
5. Collect one vertical zooplankton tow at a depth of 50 meters or 1 m off the bottom from Afognak (stations one and two), Karluk (stations two and three), Frazer (stations one and three), and Spiridon (stations one and two) Lakes at five week intervals.
6. Collect depth profiles of light attenuation (Foot-Candles) from Little Kitoi, Hidden, Upper and Lower Jennifer, Ruth, Saltery, Crescent, and Big and Little Waterfall Lakes at six week intervals.
7. Collect depth profiles of light attenuation (Foot-Candles) from Afognak (stations one and two), Karluk (station three), Frazer (stations one and three), and Spiridon (stations one and two) Lakes at five week intervals.
8. Measure dissolved oxygen (mg/L) and temperatures ( $^{\circ}\text{C}$ ) from the lake surface to the bottom from Little Kitoi, Hidden, Upper and Lower Jennifer, Ruth, Saltery, Crescent, and Big and Little Waterfall Lakes at six week intervals.
9. Measure dissolved oxygen (mg/L) and temperatures ( $^{\circ}\text{C}$ ) from the lake surface to 50 meters (or bottom if less than 50 meters) from Afognak (stations one and two), Karluk (station three), Frazer (stations one and three), and Spiridon (stations one and two) Lakes at five week intervals.
10. Measure the water clarity from Little Kitoi, Hidden, Upper and Lower Jennifer, Ruth, Saltery, Crescent, and Big and Little Waterfall Lakes with a secchi disc at six week intervals.
11. Measure the water clarity from Afognak (stations one and two), Karluk (station three), Frazer (stations one and three), and Spiridon (stations one and two) Lakes with a secchi disc at five week intervals.

### ***Laboratory Processing***

12. Process and analyze water samples from the Kodiak Archipelago at the NIL for the following nutrients, water chemistry parameters, and algal pigment concentrations: Total Phosphorus (TP), Total Filterable Phosphorous, (TFP), Filterable reactive Phosphorous (FRP), Total Ammonia (TA), Nitrate + Nitrite, pH, Alkalinity, Chlorophyll a, and Phaeophytin a. Total Kjeldahl Nitrogen (TKN) analyses will be subcontracted to the South Dakota University laboratory.
13. Process zooplankton samples from Kodiak Archipelago Lakes for seasonal mean density, biomass, and size of each species of macrozooplankton at the NIL.
14. Process zooplankton samples from southeast Alaska (Chilkoot, Chilkat, Hugh Smith, Hetta, Mc Donald, Kutlaku, and Klawock) Lakes for seasonal mean density, biomass, and size of each species of macrozooplankton at the NIL.

### ***Procedures***

Field sampling, laboratory processing, and analyses will follow the procedures outlined in ADF&G (2002) and Koenings et al. (1987). The FRM project will also follow specific operational plan procedures (ADF&G *in prep*).

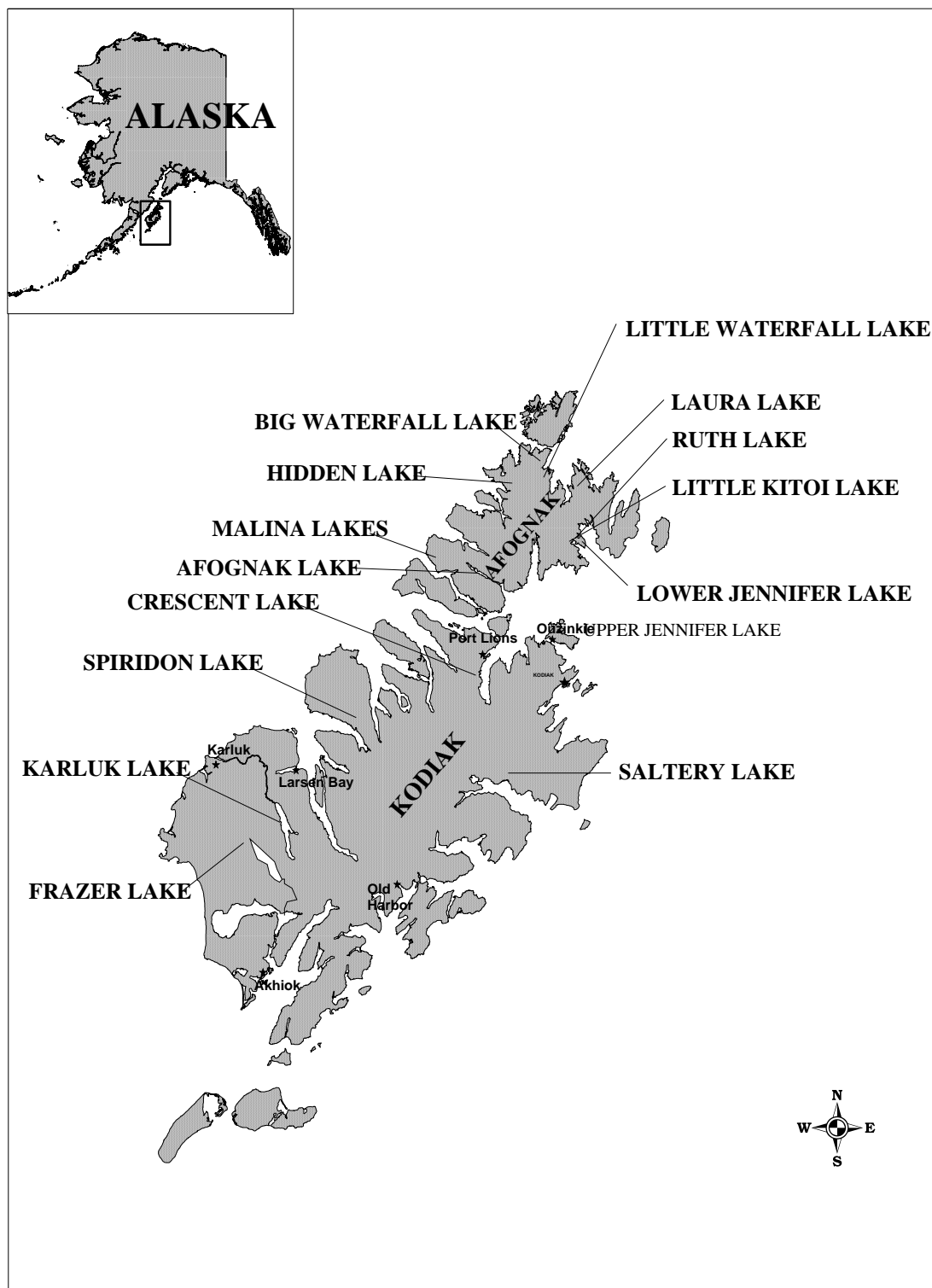
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**Table 1.**-Limnology sampling schedule, and number of water and zooplankton samples, by lake in the Westward Region for the 2007 field season.

Lake	Number of Stations	Sampling Month							Sampling Interval	Times to Sample in 2007	Number of Samples	
		April	May	June	July	August	September	October			Water	Zooplankton
Little Waterfall	1		Z	Z		Z	Z		6 weeks	4	0	4
Afognak	2		W, Z	W, Z	W, Z	W, Z	W, Z		5 weeks	5	5	10
Upper Malina	1		Z	Z		Z	Z		6 weeks	4	0	4
Spiridon	2		W, Z	W, Z	W, Z	W, Z	W, Z		5 weeks	5	20	10
Hidden	1		W, Z	W, Z		W, Z	W, Z		6 weeks	4	4	4
Laura	1		Z	Z		Z	Z		6 weeks	4	0	4
Ruth	1		Z	Z		Z	Z		6 weeks	4	0	4
Lower Jennifer	1		Z	Z		Z	Z		6 weeks	4	0	4
Upper Jennifer	1		Z	Z		Z	Z		6 weeks	4	0	4
Little Kitoi	1		Z	Z		Z	Z		6 weeks	4	0	4
Crescent	1		Z	Z		Z	Z		6 weeks	4	0	4
Big Waterfall	1		Z	Z		Z	Z		6 weeks	4	0	4
Frazer	2		Z	Z	Z	Z	Z		5 weeks	5	0	10
Saltery	1		Z	Z		Z	Z		6 weeks	4	0	4
Karluk	2		Z	Z	Z	Z	Z		5 weeks	5	0	10
Totals Kodiak:											29	84
Outside Region Contracts												
South East Alaska											0	100
Totals All:											29	184

Note: W - water sampling; Z - zooplankton sampling



**Figure 1.**-Location of lakes on Kodiak and Afognak Islands scheduled for limnology sampling in 2007.